

Radio Control 47380 **CAR of the Year!** ASSOCIATED RC10B2 **CAR ACTION**

THE WORLD'S LEADING R/C CAR MAGAZINE

July 1996

Summer RACING SPECIAL

Pick the right motor

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Florida racing action

■ **Select perfect gear ratios**

5 tracks you can build

HOW-TO

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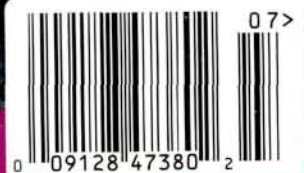
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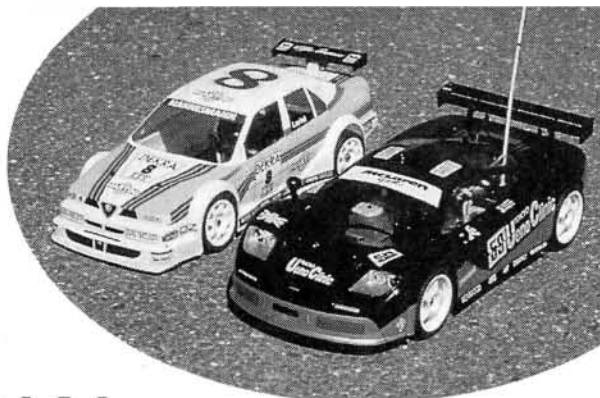


ON THE COVER (clockwise from top): Associated RC10B2 (photo by Walter Sidas); racing action from the Florida Winter Champs (photos by John Howell); Kyosho SuperTen GP (photo by George M. Gonzalez); how to apply decals (photo by Mike Ogle).

THIS PAGE: Florida Winter Champs (photo by John Howell); Tenth Technology Predator DTM (photo by George M. Gonzalez).



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Radio Control CAR ACTION

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EDITORIAL

THIS ISSUE marks the "official" beginning of the outdoor R/C season (unless you happen to live on the sunny West Coast, in which case, we snow-belters are jealous!). This is when racers and backyard bashers alike leave their basements and indoor tracks to get out into the sunshine for some healthy R/C fun. Summer is also when many hobbyists decide to abandon last year's ride in favor of

one of the latest and greatest car or truck kits that came out during the winter. Don't know which new kit to buy? This issue will perhaps clear things up for you.

In addition to new offerings from U.S. manufacturers (check out the review of the Traxxas Bandit, and the

Associated RC10B2 "Car of the Year" featured in this issue), our Japanese and European friends have barraged us with some truly exciting new stuff that's sure to get your adrenaline pumping (see the reviews of the Kyosho SuperTen touring car from Japan and the Tenth Technology Predator DTM touring car from England).

Other interesting international developments include the arrival of Serpent USA. The offspring of Serpent Model Racing Cars in Holland (one of the premier makers of gas racing cars in the world), this new U.S. division may herald renewed interest and growth in this exciting segment and provide the spark that will inspire other European and Asian manufacturers to follow suit. I had an opportunity to chat at length with Serpent president Pieter Bervoets, and I think you'll be fascinated by his comments and insights.

Some of the "biggest" happenings, however, may never reach our shores in significant numbers. For several years, in several European countries, the popularity of 1/4- and 1/5-scale, gasoline-powered cars has increased steadily, generating impressive sales for companies such as Yankee and MRC of France and spurring the construction of many permanent tracks.

Aside from a few somewhat isolated groups, these larger-scale cars just haven't yet caught on in the States. Whether or not they ever will depends on us (the consumers) and the manufacturers themselves. I've personally seen some of these "big" R/C cars, and if companies decide to market and promote them in the U.S., although they're quite expensive, there's no denying their appeal, and we sure have the space to run 'em! If you'd like to see more on larger-scale R/C, drop us a line, and we'll do our best to provide coverage.

Frank Masi, Executive Editor

We want to hear from you! Write, fax, or e-mail us on the Internet:
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Sneaky Brian

In your March '96 issue, you featured an article on Brian Kinwald's ROAR Nats winning cars. It said that Brian used Pink springs on the front and the rear of his Double-XT, but in the picture, it looks as if he used some sort of silver or gray springs in the front. Was this an error, or is Team Losi testing a new kind of spring?

DANIEL J. LYNCH
Santa Rosa, CA

Hey, Daniel, that wasn't a misprint; those are Pink springs mounted on the front of Brian's truck! He just removed the powdered coating so no one would know what the heck he uses. At our local track, you just aren't cool unless you remove the paint from your springs. Just remember to leave the paint on the last coil, or you'll be lost, dude!

George

saved by using all of Losi's graphite parts? And, will there ever be a shootout between the Double-X and the Associated RC10B2? TRAVIS FUKUMITSU
Honolulu, HI

Travis, Brian has his shocks anodized somewhere in California. I guess it doesn't matter where, because I don't think you'll fly to CA to have your shocks anodized! I would check with some of the machine shops near your home; they're bound to know someone who does this kind of stuff.

Use a no. 38 drill bit to make that extra hole on the rear suspension arms. Pick one up at an industrial supply store. You might also find one at a very well-stocked hardware store, but most hardware stores don't carry numbered drill bits. If you have problems finding this bit, pick up a 3/32-inch drill bit and an inexpensive 4-40 tap.

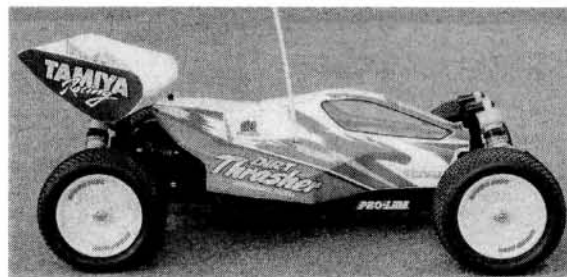
After you drill the extra hole with the 3/32 inch bit, partially tap the hole. This should allow you to screw in the nut without the risk of splitting the arm.

If you install all the graphite and light aluminum parts on the Double-X, the car probably will be under weight according to ROAR rules. As for the shootout between the Double-X and Associated RC10B2, stay tuned, because it's coming!

George

Let's Go Rally Racing

I'm thinking about converting an old RC10CE into a rally car so I can drive on- and off-road.



Tamiya Dirt Thrasher

Can you please tell me what parts I will need and where can I get them? Also, I'm thinking of running a modified motor, such as the Reedy Sonic; which ESC would handle this motor better—a Tekin Titan or a Novak Rooster? And I have a question from a friend: he has an older YZ-10, and the gear that the motor turns is stripped. Where can he get a new one? He ordered one from Yokomo, but they sent him the part for the new YZ-10. Thanks for your time and help.

B.J. McANDREW

B.J., we've finally finished our rally cars, so you can expect an article in the next issue. You'll be surprised to know that you'll need only a few parts to complete the conversion. We listed these parts in "Chris's Back Lot" in the May '96 issue of *R/C Car Action*, but here they are again:

- Parma's universal body mount set—part no. 10450;
- Pro-Line Rally Hawg tires—8061 (rear), 8155 (front);
- Just about any "wide body" on-road body, so the choice is up to you.

Of the two ESCs you mentioned, the Tekin Titan ESC is better-suited to lower-turn (below 17-turn) modified motors. The Rooster works best with motors above 17 turns.

As for your friend's question, call

GHI/Ultimate Hobbies at (714) 921-0322, and describe your problem.

George

Super-Wide Sedan

I recently bought a Tamiya TA02 chassis. In the April '96 issue, Dan Haas wrote a "Thrasher Test" on the Tamiya Dirt Thrasher, and I noticed that many of the parts are interchangeable with those on my sedan. I want to swap the arms, outdrives, etc., but I need a parts list. Also, is there a way to waterproof the electronics in my sedan?

CHARLES McMILLIAN
Herndon, VA

Charles, are you trying to build a super-wide sedan, or are you considering converting your TA02 into an off-road buggy? I think a sedan equipped with Dirt Thrasher suspension arms would look a little odd sitting on the grid with nine normal width 4WD sedans. If you're considering converting your sedan into a buggy, here's what you'll need:

- Suspension part tree numbers 0005375, 9005318, 0005378, 50554, 0335102, 9005321, 50648 and 0225035;
- Damper shafts—9405671;
- Two sets of drive shafts—P9805370;
- Springs—9405617 (includes front and rear);
- Dirt Thrasher body—506705;
- Wide stud spike tires—53059.



I saw Brian Kinwald's Double-X in the March issue of *R/C Car Action*. Where and how did he get those awesome-looking blue shock bodies? What size drill bit did he use to drill the extra shock mounting holes? What kind of hardware did he use to mount the upper portion of his shocks? It obviously isn't the standard screw and nut. How much weight is



LETTERS

Yes, this is a lot of parts, and yes, you will spend a ton of cash! But, hey, it can be done!

To waterproof your electronics, balloons work great for receivers, but you shouldn't wrap the mechanical speed control. If you have an ESC, you could seal it in a balloon, too, but only if you use the stock 540 motor; with any other motor, the ESC would get too hot. The best thing you can do for your R/C car is not to run it near water! Good luck!

George

RC10GT2?

Will Associated come out with a new version of the RC10GT?—maybe the RC10GT2? Also, do they have plans to produce a plastic-chassis T2? Thanks a lot for your time.

JORDON MUSSER
Jordon3@aol.com

As far as we know, Associated doesn't have plans to introduce a

"new" gas truck in the foreseeable future, but they have a tendency to make "running changes" to their existing kits. For example, all new RC10GT kits come with the front and rear suspension arms from the RC10T2 electric truck. There are also new front and rear shock towers for the GT (available as hop-up parts), and they further improve the GT's suspension and handling—especially on rough tracks. There's a rumor that the Team version of the GT may include the new towers as standard equipment.

Associated may or may not produce a plastic chassis for the T2 electric truck. It's certainly possible, but it depends largely on consumer demand (that's you!) and how busy Cliff, Gene, Roger and Curtis are at the moment! I wouldn't rule it out, though.

Frank

Lotsa Questions

Doog, I read your review of HPI's RS4, and I wonder whether you'll put the Kyosho Spider away now? How do you think the two cars compare? I'm even more eager to know how the RS4 stacks up against Frank's tricked-out Yoke YR-4? Have you narrowed your RS4 yet?

Also, the TA02RS doesn't have a gear diff in the front; mine came from the factory with a one-way-bearing front diff. But surely you folks knew that already; you must have had a collective brain-bomb!

On your track, how long do you race?—4 or 5 minutes? Where I race—Leisure Hours in Joliet, IL—you can modify your Tamiya car in any way you like as long as you use the kit motor—yep, the infamous RSS40S! It really makes for a close competition over 5 minutes.

And finally, do any of you have an opinion on Parma's Volvo 850 Sedan?

Sorry for asking so many questions. They just keep popping into my head as I type!
JAMES DEAN
CORY
DrDiff@
MSN.com

What's up, Dr. Diff? Here are your answers:

- To tell the truth, I won't be putting my Kyosho Spider away any time soon. I'll be subtly modifying it again; you can expect to see it in the mag again in the near future.
- I really haven't compared the two head-to-head yet; my Spider

is on my workbench awaiting a few secret parts, so it's temporarily out of commission.

- Anything I build is always cooler than Frank's limp rides!
- Uh, yes, I have narrowed my RS4, and...
- Did we say gear diff? We meant to say "near" diff! Yeah...yeah...it's our "in" word for a one-way diff. Uh-huh, right!
- We race till our wheels fall off, or until George's car breaks—whichever comes first.
- Even though you didn't have a question about where you race, I'll comment: sounds cool!
- Regarding the Volvo 850—cool body, but the chassis isn't up to speed for racing against the likes of all the currently available full-suspension touring cars.

Keep those questions comin', people!

Doog

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In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



Trinity-Troniks



I'm sure Trinity is very proud to announce that it's the exclusive distributor for the M.troniks Monster FET speed control in both the U.S. and Japan. To keep performance strong and the price down, the Monster FET was designed to be a basic workhorse. The Monster FET features fully proportional forward and brake, plus temperature-protection circuitry, and it handles stock to 14-turn modified motors. All warranty and service work will be handled in house by Trinity for quick turn-around time. The Monster FET is approved for all Street Spec racing events; list price is only \$79. Contact Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

Secret agent Tokiko-san (00 Stealth-Woman) caused a diversion (something she's extremely adept at) long enough to get this spy shot of Tamiya's new 4WD sedan chassis. Computerized image enhancement has revealed the following features: double-deck fiberglass chassis, precision center-line alignment of drive-cup and axle for greatly reduced drive-train friction and an all-new belt-drive system. Tune in next month for more "Scoop" details on what could turn out to be Tamiya's new TAO3.



Late-breaking news from Japan!

T rue to form, PROTOform remains on the leading edge of new stock-car releases. Two of its latest releases are the 1997 Pontiac Grand Prix SS and the second version of the 1996 T-Bird. The new, long-awaited Grand Prix SS body is sure to carry on the oval-track-winning tradition of past Grand Prix bodies. Even as the "big boys" were preparing the full-scale car to race in this year's Winston Cup and Busch Grand National circuit, PROTOform's Dale Epp was painstakingly incorporating all the subtle contours and details into the new, 1/10-scale Grand Prix.

The Grand Prix SS comes with an add-on rear spoiler.

True to PROTOform

Next: after dominating the velodrome race with the '96 T-Bird HS (part no. 1210), PROTOform decided that a "high-down force" version was necessary for short- to intermediate-size tracks.

This body features the latest changes made to the full-scale Fords that dominated the '96 Daytona 500 and Busch Clash. A week before Daytona, Frank Polimeda TQ'd, set a track record and won the 250-entry PA State Championships in its debut. Both bodies are available in .030 (light) or .040 (regular) weight and will fit all popular speedway chassis. Contact PROTOform, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



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Solid State RVP™ (reverse-voltage protection), digital anti-glitch circuitry, thermal-overload protection and factory-installed motor and battery connectors.

For the ultimate in realism, Novak has included brake-light circuitry and a brake-light LED accessory kit, with two LEDs to make installation easy. For more information, contact Novak Electronics, Inc., 18910 Teller Ave., Irvine, CA; (714) 833-8873; fax (714) 833-1631.

INSIDE scoop

O.S. .12 CV ABC

The new .12 CV ABC—the very latest R/C car engine from O.S.—has been designed and built from the ground up specifically for 1/10-scale car and truck racing. According to its distributor, Great Planes, the new red-anodized square head with V-shaped grooves uses Heat Vent™ technology to provide forced-air cooling that dramatically improves the engine's performance at all speeds. To increase crankcase rigidity, bolt-to-bolt backplate webbing has been added. To keep out dirt and for excellent, leak-proof fuel draw, the new 10E carb comes equipped with an O-ring on the brass throttle barrel and rubber end boot. The .12 CV comes with or without a recoil starter system. Contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



Frewer Touring-Car Bodies

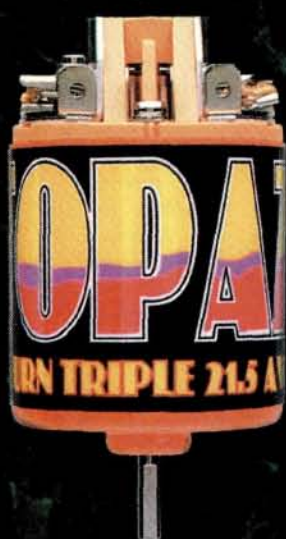
You know Japan R/C Imports—the guys who sell all those high-tech, sharp-looking Kose hop-up parts for your Tamiya, Yokomo, Kyosho and HPI sedans? Well, they've just announced that they are the exclusive U.S. distributors of Frewer Bodies. These bodies offer super detail without the high price, and that's always a winning combination in my one-track "I want everything and don't even think of charging me close to full retail" mind. Shown here are just a few of the many bodies available: Toyota Supra (front—part no. FR-4005); BMW M3 (middle—FR-4001); and Honda Civic (rear—FR-4006). Give Japan R/C Imports a call, and order their catalogue; you'll be amazed at how many body sets are available. List price is only \$18.99. Contact Japan R/C Imports, P.O. Box 7009-152, Lafayette, CA 94549; (510) 284-5778.



Tamiya Acto-Tuned M-Special Motor

Lease it to Tamiya to introduce an electric motor designed specifically for the smaller M-chassis vehicles such as the Mini Cooper. It was introduced, not as a cheap marketing trick, my friends, but for sound performance reasons. If you've ever read a report on a FWD car in *Road & Track* or *Car and Driver*, you've seen the term "torque-steer." Well, our little versions are subject to the same undesirable—and irritating—phenomenon. That's why Tamiya has introduced the M-Special motor. Its super-short-stack armature pro-

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—TOPAZ—
4WD Buggy/1:10 Oval
11 Turns, 3 Winds
36,750 RPM, No. 9200



—RUBY—
2WD Trucks/Buggies
16 Turns, 3 Winds
25,600 RPM, No. 9201



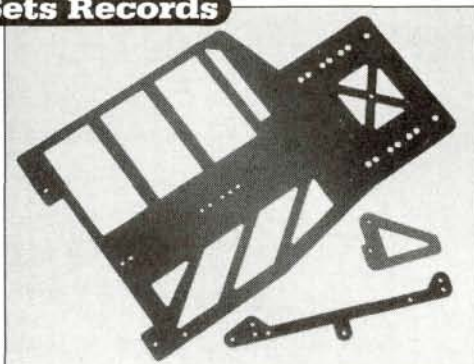
—SAPPHIRE—
Monster Trucks, Planes, Boats
17 Turns, 1 Wind
24,150 RPM, No. 9202



—DIAMOND—
1:10 On-Road/Oval
12 Turns, 2 Winds
33,750 RPM, No. 9203

Prototype Sets Records

During final testing of the prototype, Hyperdrive's new superhighway chassis, the HP-500, broke not one but two track records, according to its distributor, PTI. The light and durable new chassis is made of aircraft-grade graphite. The centers of the battery slots are offset 4 inches to the chassis centerline, and this allows improved setup adjustment. For more info, contact Progressive Technologies Inc., P.O. Box 950, Pilot Mountain, NC 27041-0950; (910) 368-1375; fax (910) 368-1380.



duces less torque (hence less torque-steer) while delivering greater rpm (about 24,000) to yield more horsepower, so top speed is not sacrificed.

Check it out: the super-short can size allows the motor to be mounted dead center in the gearbox for better weight distribution; adjustable timing allows the motor to be run in either forward or reverse rotation for use in both M01 and M02 chassis. Part no.—53251; list price—\$49. For details, contact Tamiya America, 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A.

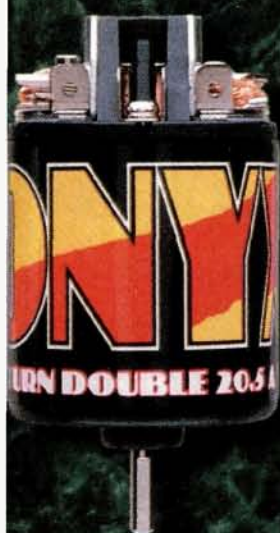
No Uncle Sven

From Factory Works, the people who brought you the Volvo 850 wagon body, comes this new 95/96 850 Volvo sedan. The sedan comes with headlight, taillight, grill and rear-emblem sticker sheet, precut window masking, rear wing and mounts. There's lots of 3-D detail, such as the front air dam with scale splitters and air intakes molded into the body. Also new from Factory Works is a new sticker sheet for the BTCC 850 Volvo wagon body. The sheet is silk-screened on 1-mil, clear Mylar in five colors and coated with clear UV protectant for a long-lasting, smudge-proof, concours-winning finish. Also included are instructions for painting your 850 wagon in Volvo's BTCC colors and for correct sticker placement. Contact Factory Works, 505 N. Smith #105, Corona, CA 91720; (909) 735-5516; fax (909) 735-5642.



While we're on the subject, a bit of clarification is in order. Allec & Lane Mfg. diversified by becoming two separate companies—A&L Mfg. (Chris Allec) and Factory Works (Daryl Lane). A&L Mfg. will concentrate on expanding its already fine line of off-road buggy and truck bodies, wings, body braces, MRC World Scale parts and OEM body works. Factory Works took on the task of expanding its fine line of shock towers, steering kits and drive-train accessories; it also plans to develop sedan/parking-lot bodies.

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-JADE-
2WD Trucks
15 Turns, 4 Winds
27,060 RPM, No.9206



-QUARTZ-
Touring/F-1, Planes, Boats
19 Turns, 2 Winds
21,540 RPM, No.9207

Speed Gems machine wound modified motors are an excellent alternative for a racer on a budget. Constructed with the same superior quality components as our expensive modified motors, they have a machine wound armature. This combination produces an extremely fast motor at about half the cost of a hand wound. Only \$49.99 list. For a rare combination of performance and economy, acquire a Speed Gem today.

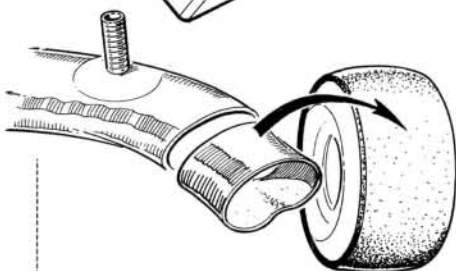
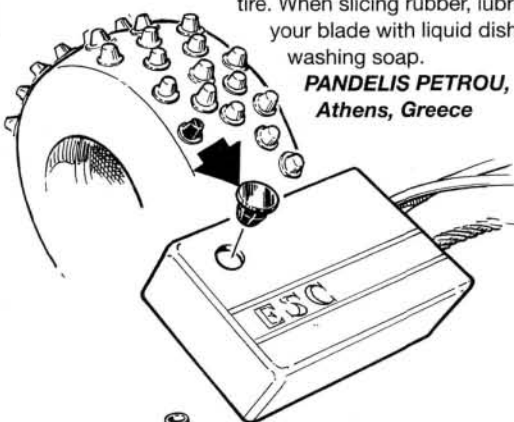
TRINITY
1901 East Linden Avenue, Suite 8
Linden, New Jersey 07036
Telephone (908) 862-1705
Facsimile (908) 862-6875



ESC Plug

To replace a lost ESC plug, slice a rubber pin off an old tire. When slicing rubber, lubricate your blade with liquid dish-washing soap.

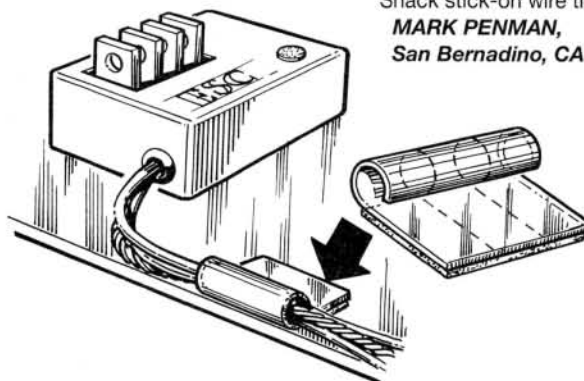
PANDELIS PETROU,
Athens, Greece



Tidy Wires

To keep everything tidy and reliable, use these Radio Shack stick-on wire ties.

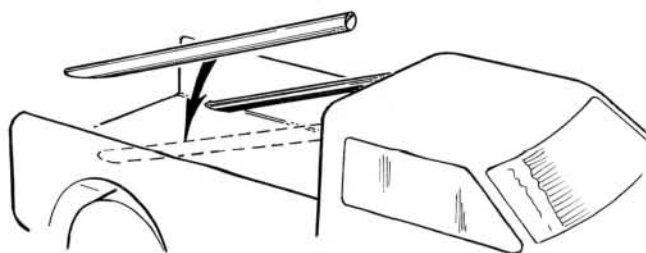
MARK PENMAN,
San Bernadino, CA



Retread Road Tires

Cut a section off a suitable bicycle-tire inner tube, then glue it over your worn street tires. For a better grip, sand off the tube's shiny glaze.

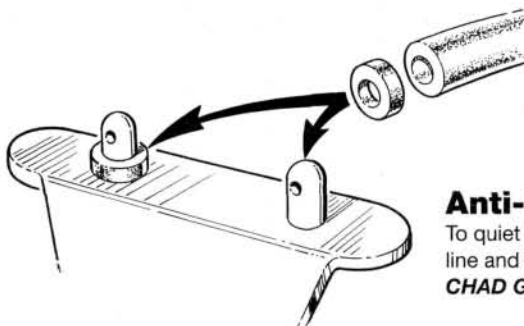
ART PITTMAN, Bolling AFB, Washington, D.C.



Fake Roll Bars

To give your truck the full supertruck look, cut and paint drinking straws and glue them to the back of it with CA.

ROBERT SINCLAIR, JR., Lincoln Park, MI



Gas-Tank Seal

To improve the gas-tank seal on the Kyosho Inferno and other types of gas cars, jam a $\frac{3}{8}$ -inch-long (10mm) piece of silicone fuel line (a) into the rubber seal (b) on top of the gas tank. This makes a tighter seal on the metal fueling hose (c) and eliminates messy overflows.

ALFRIM STEVADJI,
Jakarta, Indonesia



Anti-Rattle Mounts

To quiet body rattle, slice thin rings of silicone-rubber fuel line and slip them over the body mounts.

CHAD GRITZMAKER, Clayton, MI

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



TRUBLE SHOOTING

by George M. Gonzalez

Radio Problems

I've just subscribed to *R/C Car Action*, and I love the magazine. I'm afraid, however, that I don't feel the same about my R/C car. For Christmas, I received a Team Losi Double-X; it's equipped with a Reedy Sonic modified motor, a Novak Racer ESC and a JR Python radio with stock receiver. After setting up the car and radio gear, I took it for a spin around my block. It ran

great. Soon after, I decided I wanted to try to race, so I went to a club race near my house.

This racing club uses clothespins that have a radio frequency number stamped on them. I charged up my battery pack and headed out to do some laps. As soon as I hit the track, my car started to go crazy! No one in the facility was using the same frequency as I was (68 AM), and no one was listening to a radio. I had my radio gear tuned by the co-owner of the club. I checked all my connections and even tried switching my radio gear with the owner, but nothing made a difference. Everyone I talk to is bewildered. Please help.

NATHANIEL SONKISS
Waterford MI

Wow! How frustrating! Although there's nothing worse than radio problems, they're usually the easiest to trou-

bleshoot. The cause of the problem is almost always faulty equipment. If your car works fine at home, but glitches like crazy at the track, someone at the track is on your frequency or one frequency that's close to yours. Someone at the track might be unaware that AM and FM radio waves can interfere with each other. You also mentioned something odd: the track co-owner tuned your radio gear? If you mean checked it out, that's cool; but if he or she opened up the radio and performed surgery on it, I would want to look at his or her credentials. Have your radio tuned by the factory only!

Most racers carry extra crystals because sometimes, other racers at the track don't have a clue which frequency they're on; this could be a real nuisance. Other times, the equipment—

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Willton CT 06897-3035. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

not incompetence—is the cause of the radio's problems. I troubleshoot radio problems in the following order: first, switch crystals; if the problem continues, switch receivers; if there's still a problem, change radios. I've even gone as far as to replace the steering servo and ESC because of faulty wiring. Make sure the plugs that are attached to the end of the servo and ESC wires make good contact inside the receiver; one loose or frayed wire could foul things up royally. Also, do you have capacitors installed on your motor? If not, be sure to add them.



Unbalanced Tires

After carefully mounting the front tires on my RC10T2 and spinning them, I noticed that the tread weaves in and out and the tires always stop spinning with the heavy side down. The foams are straight. The beads are in the wheel slots, and the wheels are OK. Is it important for off-road tires to be properly balanced, or am I making a big deal out of nothing, especially since my truck is plenty fast?

RAY SHORT

Ray, it sounds as if your tires and wheels might be

out of balance. This is a common problem, but if your truck is fast enough, you might want to leave your tires the way they are. If you're serious about racing and you

want your truck to perform its best, you might want to balance your tires. Pick up some golf-club weights at a sporting-goods store. These come in small increments and have adhesive tape on one side.

Find the heavy spot on each tire, and mark it. Next, install one of the weights on the opposite side of the wheel, and give the tire another spin. The goal is to have the tire stop in random locations. If it continues to

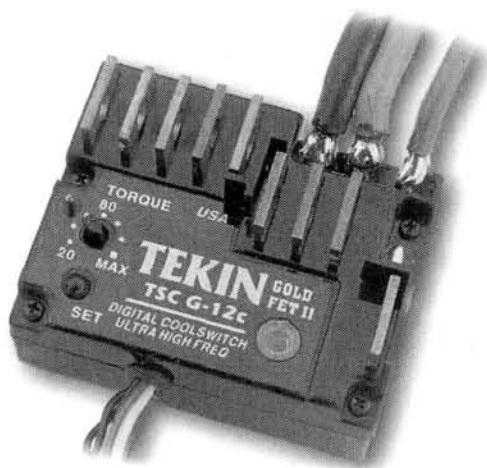
stop on the same mark, place another lead weight on the opposite side of the wheel. Continue this process until the wheel is balanced.

If you wash your tires after every run, be careful not to submerge them in water. If you get the foam inserts wet, your tires will become drastically out of balance. Once I had to throw a set of tires in my clothes dryer (on a low-heat setting and wrapped in a towel) because the foam inserts got soaked. I hope this information helps you.





by John Rist



Tekin G-12c

LOOKING FOR a mean speed control?—one that could take you all the way to a national championship? Take a close look at Tekin's* top-of-the-line G-12c. Meant for flat-out racing, it was designed to have *super-low* resistance.

To accomplish this, the G-12c is a forward-only-with-brakes controller that uses five, ultra-low-resistance MOSFETs and 12AWG battery and motor wires—a super-low-

resistance setup that virtually eliminates heating.

And its microprocessor control allows the inclusion of a bevy of pro features, such as high-frequency motor control, current limiting (punch control), and QuickTune one button setup.

Also setting this controller apart is that its wires are easy to replace, and they can be cut very short, without fear of future installation problems. The standard connectors (Tamiya-style battery, and bullet-style motor) that come on most sport-style controllers are completely useless for racing. They waste so much power and overheat so much that I've actually seen them melt. This unit is intended for serious racing: hard-wire it, or install high-grade connectors such as those by Deans* (Ultra-Plug) or Litespeed*.

The 20-page instruction book has some really good pictures, and the section on transmitter adjustments is outstanding. If you follow the setting given in this chart, you'll have the best possible throttle response.

Of course, in the service of my loyal readers, I

had to look inside. What did I find?—computer-grade components and workmanship; five FETs that provide the massive current handling for forward—wired in parallel for very low resistance; two FETs for strong braking; a Schottky diode—protects the G-12c from the massive “noise” spikes generated by the motor and plays a major role in providing the path for current regeneration; and a massive BEC voltage regulator.

TEST 1— RESISTANCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its “on” resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's “on” resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• **Voltage drop along the full length of the battery wires and motor wires:** 0.06 volt—a resistance of 0.004 ohm.

• **Voltage drop 2 inches along the wires:** 0.03 volt—a resistance of 0.0025 ohm—*amazingly low! As low as it gets!*

This low resistance pushes the limits of my measuring equipment and makes it impossible to distinguish between the top-rated three or four controllers. It's so low, in fact, that taking it any lower would not improve your R/C vehicle's performance.

TEST 2— OVERHEATING

I “cook” every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

Would the G-12c—with a heat sink—be able to take the abuse of back-to-back 4-minute battery pack dumps without overheating?

After 15 minutes, I found the heat sink was barely above room temperature. Install the heat sinks and mount the G-12c where it can get cooling air, and it should be able to handle multiple hot-wind modified motors.

TEST 3— SHORTING OUT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. I put a dead short across the motor leads, and the current jumped to 35 amps (the limit of my power supply).

After a minute, the G-12c had warmed up a little—very little. I attribute this to what Tekin calls its Coolswitch FET switching circuitry. I guess that this circuit boosts the drive to the FETs and makes sure that they stay saturated fully on, even when the input voltage starts to get low. Whatever the reason, the G-12c can stand a lot of abuse and keep its cool.

ROAD TEST

The instruction book's wiring diagram shows which wire goes where (a three-wire controller is tricky for a first-timer) and shows a Deans Ultra-Plug.

WHAT IT HAS

- Forward-only with brakes (no power-robbing reverse).
- Massive 3-wire battery and motor hookup.
- Five FETs for forward, two for brakes, one Schottky diode, and a massive BEC voltage regulator.
- High-frequency motor drive.
- Automatic thermal protection.
- QuickTune setup button.
- Built-in pulse-checking LED for monitoring neutral and full speed.
- Calibrated current-limiting control dial.
- Current limit test point.
- Reverse-polarity battery-protection fuse.
- Power on/off switch.
- Receiver plugs for all the popular brands of radios.
- Extra red monster wire for hooking up the battery and motor.
- Accessory kit that includes the following: heat sinks, motor caps, servo tape, tie wraps, decals and an instruction book.



I installed the controller in my MRC MT-10S truck; I hard-wire my motor and use a Litespeed connector between the battery and the controller.

SPECIFICATIONS

DIMENSIONS

Height (w/heat sink)1.12 in.
Width1.41 in.
Length1.76 in.

WEIGHT

(w/wires and heat sink)2.5 oz.

TUNING

Access to controlsExcellent
Ease of adjustmentExcellent

LIST PRICE/WARRANTY\$199.99/120 days

ELECTRICAL (Mfr.'s specs)

Voltage

—maximum (12 cells) 15 volts
—minimum (4 cells) 5 volts

Max. currentNot listed

Continuous current350 amps

Resistance0.00125 ohm

TEST PARAMETERS

Voltage6 volts

Current12 amps

Voltage drop

—along length of wires0.06 volt

—2 in. along wires 0.03 volt

Resistance*

—along length of wires0.005 ohm

—2 in. along wires0.0025 ohm

BEC voltage, 6-cell pack5.63 volts

* Resistance = Voltage drop ÷ Current

COMMENTS: this is a true, pro-quality racing speed control with world-class low resistance, high-frequency motor control and torque control; it stays cool, even under a heavy load. It's small enough to fit a 1/12-scale pan car, yet strong enough to handle multiple modified motors. Based on the world champion 411-G2, this purebred with improvements must be a winner.

The Deans Ultra Plug is also really good and has the advantage of being polarized, which prevents you from accidentally plugging the battery in backward. The controller would survive this by blowing its reverse-voltage fuse link, but you may well miss the start of a race because you're back in the pits trying to solder the link.

I charged several 6-cell battery packs and headed to my front yard to have some fun. I live in the country now, so I can drive a massive loop across my yard and down the bank to the road, and then scream back along the road and across the yard. It's a great place to let my grandsons drive because they can go fast without worrying about hitting something.

With a 6-cell pack installed, I hit my MRC MT-10S's throttle, and it exploded off the line, spinning its back wheels with a vengeance—one hot performer with no bad habits. Slow and moderate speeds are silky smooth with precise control; braking is very strong, but controllable. Run times were longer than I had expected for my current gearing.

Running the battery to a complete dump did not lead to a loss of control, because of the power-management "smarts" built into microprocessor control.

As the battery dumps, the G-12c decreases the current going to the motor and ensures that there's enough going to the receiver to keep it working properly. This is bound to save a race or two when, on a virtually dead pack, your vehicle makes it that last 10 feet down the straightaway without veering into the wall. Range-checks showed a solid performance way past the range needed to cover any race track. After every run, the battery and motor were smoking hot, but the G-12c was barely above room temperature. Given even marginal cooling air and the Tekin heat sink, this controller will never overheat.

To test the current limiter's full range, I turned it down to minimum, put the car down and hit the throttle; the car would only crawl. I then jacked up the current limiter a little at a time until the car ran at full speed but did not spin its wheels at takeoff.

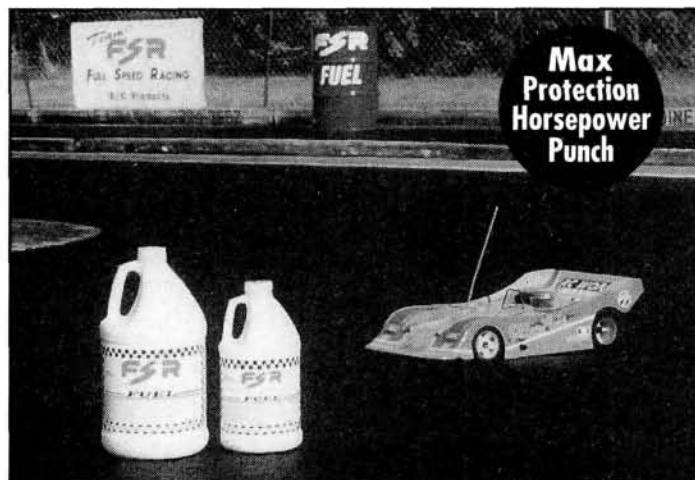
SCOPING SUMMARY

The term, "New and improved" is over-used, but it's hard not to use it when describing the G-12c. There just isn't any heating, and the unit will be able to handle multiple modified motors with ease. The smoothness of the throttle is especially noticeable at slow to moderate speeds, and the G-12c has the kind of control that should make it a snap to motor around tight roadcourses.

The current-limiter circuit works well, and it's now adjusted by means of a calibrated knob, not a trim pot. It's easy to try different settings (no need for a digital voltmeter), but Tekin has retained the test point for those who want to double-check the setting with a voltmeter. I did this and found the dial calibrations very close, but it isn't as precise as using a voltmeter.

If you want to see a G-12c in action, just attend any major R/C race and look in the winners' circle. You're sure to see it there.

*Addresses are listed alphabetically in the Index of Manufacturers on page 181. ■



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1997 IFMAR 1/8 On-Road World Championship

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FSR (Full Speed Racing) also manufactures a full line of racing parts and accessories for gas and electric cars.

3941 Legacy Drive, Ste. 204, Plano, TX 75023 USA

Tel: 214-618-7038 Fax: 214-618-7637

TRINITY

Billet-Aluminum Servo Mounts

To eliminate bump steer, these purple-anodized servo mounts are fully adjustable for servo height. They come with mounting hardware and are available to fit all 1/12- and 1/10-scale pan cars.

Part no.—RC6053; price—\$10.99.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



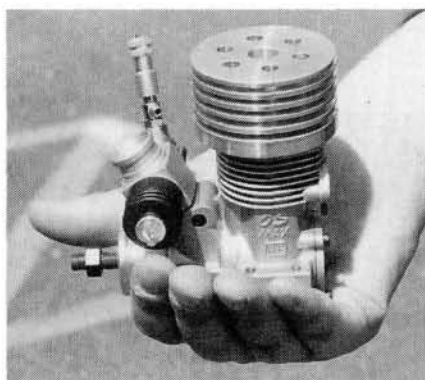
DYNAMITE

Super Con Rod

This new conrod is machined of 6061 T6 aluminum and includes a proprietary, alloyed lower bushing. Its oil port is located at the 60-degree position; this avoids reduction of the all-important cross-sectional area that other rod designs ignore. Because it weighs nearly 30 percent less than stock rods, the Super Con Rod has less reciprocating mass; this leads to greater acceleration, higher rpm and reduced stress. It is available to fit Dynamite, Thunder Tiger and O.S. .12-size engines.

Part nos.—DYN6208 (fits TNT & Thunder Tiger .12 engines); DYN6209 (fits O.S. .12-size engines); price—\$11.95 each.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.



DAVIS DIESEL

Converter System for 1/8-Scale Vehicles

With this system, convert your OFNA Force 21 or O.S. RFB .21 engine to diesel. Davis Diesel claims that you will more than double your mileage and eliminate the need for glow plugs. For maximum success, all drive gears should be steel, not plastic. The greatest maintenance problem is keeping the tires glued to the rims.

Prices—Force, \$64.95; O.S., \$74.95.

Davis Diesel, P.O. Box 141, Milford, CT 06460; (203) 877-1670.

PRO-LINE

Sedan Speed Hawgs

Available to fit your Tamiya, Yokomo, HPI and Kyosho touring sedan, these new treads are low profile, with minimal sidewall flex, and they provide aggressive traction. Made of Pro-Line's exclusive "M" compound, the tires provide rigidity and adhesion on any asphalt or concrete racing surface. Available in both standard front (part no. 1086) and wide rear (1087) sizes.

Part nos. and prices—1086 (ZR-86 Sedan Speed Hawgs, standard front), \$12.50; 1087 (ZR-87 Wide Sedan Speed Hawgs, rear), \$12.50.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



TEAM LOSI

GTX

This new, 1/10-scale gas truck features an ultra-rigid frame with an aluminum lower chassis attached to an upper molded deck. The constant-pressure 75cc fuel tank is three-point mounted on rubber grommets to isolate it from vibration. The truck also features a new, linear braking system, custom laydown tranny, universal swing-shaft drive and a two-shoe adjustable clutch. It's powered by the new Dynamite TNT .12R engine and is available in several versions: the GTX offers full bushing construction, an aluminum chassis and standard anodized shocks; the GTX Pro comes with full ball bearings, an anodized aluminum chassis and hard-anodized shocks. Both versions are available with or without an engine.

Part nos. and prices—LOSA0950 (GTX without engine), \$324.95; LOSA0951 (GTX with TNT .12R pull-start), \$459.95; LOSA0952 (GTX Pro with TNT .12R pull-start), \$579.95; LOSA0953 (GTX Pro with TNT .12R non pull-start; LOSA0954 (GTX Pro without engine), \$449.95.

The Team Losi GTX; distributed exclusively by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.



KYOSHO RAV4

This rugged, sport-utility truck kit comes 80-percent assembled and includes a recoil-start engine. The four-wheel, independent, double-wishbone suspension features long-stroke arms and four oil-filled shocks. The slipper clutch inside the sealed gearbox delivers better traction and adjustability. The gearbox also includes four ball bearings for added reliability.

Part no.—KYOC0507; price—\$379.99.

Kyosho; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

ADVANCED PRODUCTS R/C Speed Pro Version

This IBM-compatible program will help you to set up and tune your car or truck for better performance. Simply input all your car's setup



information, and a printable display chart instantly gives you speeds and gear ratios for all pinions made in your selected pitch. This new program even calculates in wind resistance and rolling and cornering friction!

Part nos.—RC-100 (3 1/2-inch disk); RC-200 (5 1/4-inch disk); price—\$19.95 each (plus \$2 S&H).

Advanced Products, P.O. Box 1193, Middleton, MA 01949-3193; (508) 777-0380.

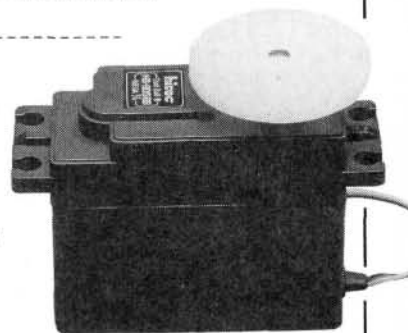
HITEC

HS-805BB Mega Servo

Slightly larger than the HS-700BB, the 805BB provides nearly double the torque. A deep, 15-tooth spline provides extra strength for all your 1/4-scale applications. It is also great for use with aluminum aftermarket chassis Clod Busters. This servo is available in three popular connectors styles—Hitec/JR, Futaba J and Airtronics.

Part no.—HS-805BB; price—\$73.95.

Hitec RCD Inc., 10729 Wheatlands Ave., Ste C, Santee, CA 92071; (619) 258-4949; fax (619) 449-1002.



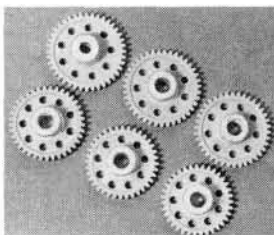
PARMA/PSE

Pocket Rockets

These ground-breaking pinion gears weigh less than a gram, have a low rotating mass and are made of tough "Dura-Last Nylon."

Part nos.—93135 (35 tooth, 64 pitch); 93136 (36 tooth, 64 pitch); 93137 (37 tooth, 64 pitch); 93138 (38 tooth, 64 pitch); 93139 (39 tooth, 64 pitch); 93140 (40 tooth, 64 pitch); price—\$3.50 each.

Parma/PSE Intl. Inc., 13927 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



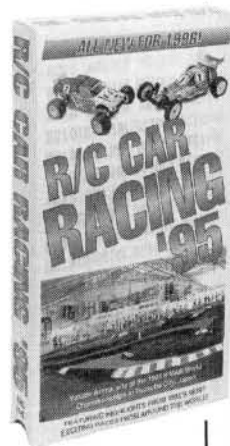
ASSOCIATED

R/C Car Racing '95

This new, 1996 video release features all the racing highlights of the 1995 season; it includes action from the Reedy International Race of Champions, the Florida Winter Champs, the NORRCA Off-Road Nationals, the IFMAR World Championships in Japan, the ROAR Nationals, the NORRCA Gas Truck Nationals and the Winterfest Oval Racing at the Velodrome.

Part no.—6977; price—\$19.95.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.



TAMIYA

Rover Mini Cooper

This 1/10-scale rally racer has a tough, light M-01 monocoque-type chassis with FWD mechanics, a front-sealed gearbox, four-wheel, double wishbone, independent suspension, coil-spring damped mono-shocks, a highly detailed body and authentic '94 Monte Carlo Rally decals. The kit comes with a three-step mechanical speed control and a 540-type electric motor.

Part no.—58163; price—\$243.

Tamiya America, 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A.



Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 251 Danbury Rd., Wilton, CT 06897-3035.



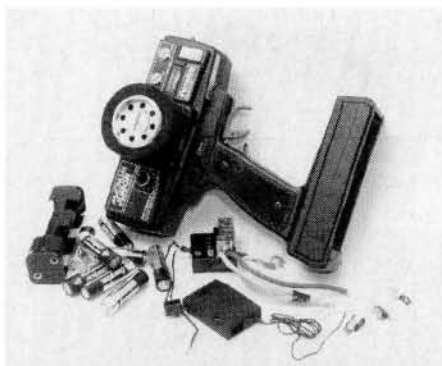
Getting Your Off-Road Ride Ready for the Racing Season

ELECTRONICS

Unless you use your transmitter for indoor racing during the off-season, the batteries in your radio are probably dead. If they're alkaline cells, they may have leaked all over the inside of your battery case. Pull the old cells, and if they're Ni-Cds, cycle and recharge them. Discard old alkaline cells (properly, of course), and replace them with nice, fresh, new ones. If the cells leaked, or if they corroded your battery case, replace it. Most mail-order businesses and hobby shops carry new battery boxes for the popular radios.

If you've experienced an inordinate number of glitches or "hits" on any frequency, now is a good time to replace your transmitter and receiver crystals. Many times, I've seen people on the stand scream about some other racer operating a radio on their frequency! Often, the real problem is that their own crystals

are defective. My radio allows you to buy transmitter and receiver crystals separately, instead of strictly in pairs. Usually, the receiver crystal is the one that has gone bad, because of the many wallops it receives during use.



Pull the old cells out of your transmitter, and give it a good cleaning. If necessary, check all your crystals during the off-season, and replace them. Send your speed control or receiver to the manufacturer for repair or tuning.

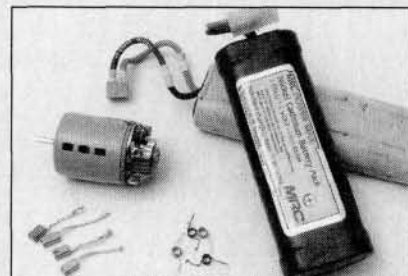
Is your radio ugly, dirty and covered with dust, grime and tacky old decals? Now's a perfect time to remove the dust with a dry paintbrush; then remove grime and decal glue by rubbing with a soft cotton rag moistened with lighter fluid. Replace the nasty old decals with some fresh, new ones. Using

BAD THINGS CAN happen to your off-road equipment as it sits around during the winter. It's not just the previous season's dust and grime left over from the last event that has to be cleaned off; it's the stuff that you don't know about—the hidden corrosion and the under-

lying broken, bent, or worn-out parts—that will demand your attention. This is also a good time of year to get your equipment refurbished by the manufacturer. Follow me as we go over a truck and a buggy and get them ready for the next season of off-road racing.

MOTORS AND BATTERIES

Do you run in the modified class? Now's a good time to true the commutators on all your modified-motor armatures; that way, you'll have more choices as the season progresses. How about stock? There's a whole new batch of stock motors out there! Before the season begins, take time to scope them out. Find out which one will best suit your needs, and pick up one or two for the season openers. Are you stuck with last year's (or the year before's) motor technology? Find someone who can clean your



Look over your battery packs, and replace worn wires or connectors. New brushes and springs can add life to last year's stock motor.

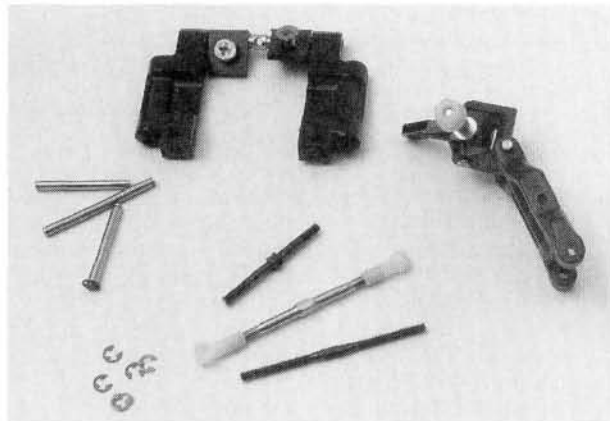
motors and cut the commutator to ensure maximum performance and longevity. Replace the brushes and springs, and you'll be ready to hit the track.

What kind of shape are your batteries in? Are last year's packs looking pretty tired, with bare wire between the cells and the connectors? Do you need to stock up on new packs? Maybe you should have your cells rematched, especially if you've been using them for a couple of years. At the very least, examine them carefully, re-apply shrink-wrap if necessary (battery shrink-wrap is available by the foot from most hobby shops), and replace or clean the connectors. This kind of attention will ensure that all the voltage you pack into your cells will be available to blast your truck or buggy past the guys who've spent all winter napping!

now. Companies such as Tekin*, Novak*, Futaba* and others can usually get your electronic components back to you in a few weeks, good as new and ready for more fun.

CHASSIS

Because your newly restored electronics will stick much better to a clean chassis, you should clean it while you have the electronic components off. Use a stiff, dry paintbrush to remove most of the dust and thick crud; then wipe the chassis with lighter fluid where necessary. Lighter



Check the hinge pins, turnbuckles, suspension arms and chassis for straightness, cracks and wear. While you're at it, replace all the E-clips.

fluid is an excellent, weak solvent that doesn't attack sensitive plastics or resins, and it softens many glues and residues.

Repair or replace your chassis now—not halfway through the season. Strip off all the suspension parts, and inspect the chassis for cracks, chips, warps and wear. Often, you'll find small cracks near suspension-arm or transmission-mounting holes. You'll never find these problems while the suspension is mounted, because they're hidden by screw heads and suspension components. In most cases, a new chassis is cheap if you need it. If your equipment is in good shape, your season will start out stronger.

To check whether the hinge pins are still straight, roll them on a flat surface, such as a tabletop or a piece of glass. Straighten them with a vise and some good slip-joint pliers, or, better yet, replace them with new ones if they wiggle as they roll. If they're fairly straight, insert them in a drill or a Dremel* tool; turn it on, and polish them with fine, 600-grit wet/dry sandpaper or metal. Your suspension arms will work much more smoothly with clean, straight, shiny hinge pins. Splurge and replace all the E-clips. They're cheap, so you'll be really upset if you don't replace them and they fail because of stress, or if the hinge pins drop out and cost you a race.

Do you use turnbuckle-type, adjustable upper-suspension links? If not, this is an ideal time to install them, especially if your truck or buggy is a year or two old. New rod ends or nylon cups will ensure that these links stay where they're supposed

to when you land upside down while trying to clear the triple jumps. If you've been using turnbuckles, make sure they're straight before re-installing them. I really like the Punisher series turnbuckles from Lunsford Racing*; they're made of heavy-duty, light titanium, and they should last for the life of your car or truck. Check the fit and finish of all the

support components on your ride; to make sure that nothing interferes with smooth performance, run the wheels through their entire range of travel—left, right, up and down.

As you re-mount the suspension components, check every arm, mount and hub carrier for stress cracks and breaks. Look at the head and threads of every screw, nut and bolt. Don't take a shortcut and use a screw with a head that's almost stripped or a nut with rounded corners; replace it now. I guarantee that the screw with the sloppy head slot or the nut with the corners that don't look quite right will be the one that strips at the worst time!

Do you need to rebuild your differential or transmission? For more on this

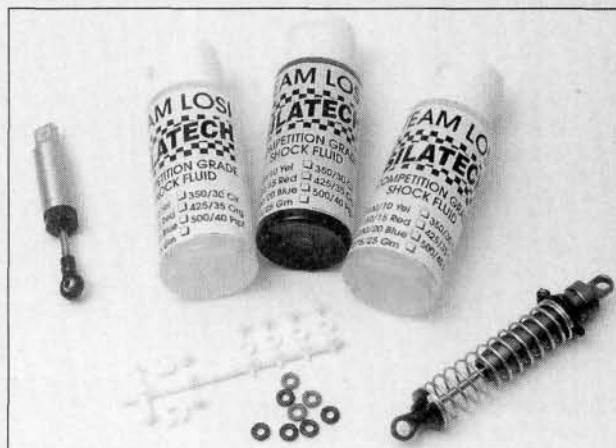
SHOCKS

Even if your shocks don't leak, you should rebuild them during the off-season. Replace the seals for sure, and see how much it will cost for a new set of pistons. Should you try some of the new RPM* dual-action piston sets or go with stock replacements? Are the shock shafts still straight? Check them the same way you checked the hinge pins; bent shock shafts won't give you smooth action on the track. You may want to upgrade the shocks on an older or entry-level model; this is the time to make these choices.

Toss your old, nasty containers of shock oil and pick up

a couple of fresh bottles. I always try to buy my shock oil from the same manufacturer. Trinity*, Associated*, Losi* and other companies make excellent silicone-based shock fluids that won't thicken when it's cold outside or thin out when the temperature soars. You'll find it much easier to tune your truck or buggy if all your shock oil comes from the same source. Have your shock springs started to sag? Are they all the same length? Take a minute and measure them now, because you won't think of this between heats when you're trying to figure out why the car is handling oddly.

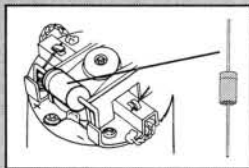
While you're at the hobby shop, replace your shock seals, and pick up some fresh shock oil in a variety of weights.



important maintenance procedure, check out Frank Masi's excellent transmission rebuild article in the February '96 issue of *R/C Car Action*.

N TEAM SECRETS

THE RACING ADVANTAGE!



External Schottky Diodes

External Schottky diodes provide performance benefits that internal Schottky diodes cannot. Once you understand the physics behind using Schottky diodes, you will understand why.

To achieve partial throttle, electronic speed controls switch the battery power full-ON and full-OFF very quickly. The ratio of the ON and OFF periods determines the throttle setting (ex. 50% ON to 50% OFF is 1/2 throttle). During the OFF period, the Schottky diode carries recirculating (or free-wheeling) current from the motor. The lower the voltage across the motor during this period, the *higher the efficiency of the electronic system*.

An *external* Schottky diode, mounted directly onto the motor, *reduces the voltage drop* to the absolute minimum. Excess voltage drop, caused by allowing the current to run from the motor back to the speed control, is eliminated. The radio interference associated with these current spikes is also eliminated. This is one reason why Team Novak uses *external* Schottky diodes on their racing speed controls.

Another reason for using *external* Schottky diodes is to reduce heating of the brake transistors to *preserve braking power*. When a Schottky diode is built into a speed control, it is installed next to the brake transistor(s). As the internal Schottky diode heats up, it heats the brake transistor(s) and decreases the braking power.

Even if you own a speed control with a Schottky diode built in, try using an *external* Schottky diode. It will give you more brakes and better performance!

Note: Sometimes the recirculating current is so great, that the Schottky diode can overheat and crack. For low turn motors, we recommend using two Schottky diodes (connected in parallel).

Team Novak makes external Schottky diodes available in Kit #5640.

NOVAK ELECTRONICS, INC.
18910 Teller Avenue, Irvine, CA 92715
• (714) 833-8873 •

Advertisement

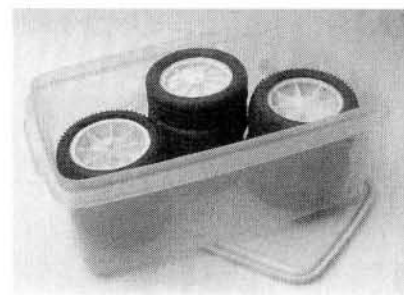
R/C DOCTOR

BEARINGS AND TIRES

Remove all the bearings from the wheels, spindles and hub carriers, and clean them carefully. Use a commercially available bearing cleaner, such as those sold by Robinson Racing*, or spray them repeatedly with motor cleaner, rotating them as you go. Allow the bearings to dry, and then lube them with a good-quality bearing oil such as AeroCar's* bearing lube, Mobil 1, air-tool oil, or BRP's* Black Gold. If a bearing feels rough when you spin it, it may be time to replace it. If you can't afford to replace a rough-spinning bearing immediately, put the nastiest ones where you can easily reach them later, e.g., on the outside of the hub carriers.

I almost always find that the tires I used at the

end of last year's racing season are now worn, dried out and useless. Take a really close look at the tire sidewalls. The tire treads or spikes may not look worn out, but the sidewall may have dry-rotted during the off months. Nothing will save a cracked tire, but Trinity's Buggy Grip or Team Associated's Traction Action may bring hardened tires back to life; follow the directions on the bottle very carefully, always use it in a well-ventilated area and don't get the spray on your skin. Many tire compa-



Keep your tires in a sealed container so that they won't dry out.

nies come out with new patterns and rubber compounds for early races such as the Florida Winter Champs every February; among these, you might discover new tires and wheels for the upcoming season. To prevent tires from drying out so quickly, store them in a large plastic container that has a lid; this will also keep the inside of your track bag clean.



This aftermarket truck body fits my Double-XT very well, and it really looks distinctive at the track!

You don't have to limit yourself to a stock replacement body, either. Many racers like a slightly different look; some feel that aftermarket bodies actually improve performance. Your only limit is your imagination. Want a really kickin' body without any painting effort? Contact Scott Bich at Bich'n Bodies* or Richard Muise at Motion Graphics* for a truly one-of-a-kind piece of Lexan artwork, or check out your local hobby shop or track to see what the local airbrush experts are putting out.

LEXAN

Now that you've straightened out the chassis, smoothed out the suspension, equipped yourself with all the proper tuning aids and ensured that your motors and batteries will guarantee you the holeshot off the starting line, think about drawing a little attention to all your hard work. Most truck and buggy bodies easily last an entire season, so it makes sense to put a lot of work into a new body.

THE GRAND FINALE

By the time you've finished with this project, you'll be ready to hit the dirt. Not only will your car or truck be ready for a new season of fun, but you'll also be pumped up and ready to drive it. Stripping your car down to the bare chassis to examine each component is

something the pros do regularly. They're intimately familiar with the condition of all the parts their winning rides, so they have the confidence to head to the track—and to the winners' circle!

*Addresses are listed alphabetically in the Index of Manufacturers on page 181.



ROAD RUNNER

Brandon Roberts' Parma '29 Ford roadster took him five months to complete. He tricked-out his ride with a Tekin G-12 ESC and a Futaba Magnum Jr. radio. Details include a wood-strip interior that is backed with black paint. From Rockmart, GA, Brandon writes, "I named it the 'Road Runner.' You can see the picture speaks for itself." It looks pretty slick, Brandon. Better watch out for Wile E. Coyote's car, though!

"GATOR"

Can you guess what A.j. Nealey's favorite sport drink is? Well, it's not Zippy's pre-fab power juice. A.j.'s RC10T2, which he named "Gator," is equipped with a Tekin 610G ESC and a 17-turn single modified motor; it's controlled by a Futaba Magnum Jr. radio. A.j., who is 11 years old and lives in



Ardmore, PA, glued the labels from a Gatorade bottle to the inside of the body and then spray-painted over them. The green paint was blended into the yellow paint on the rear of the truck to match the wheels. It looks pretty cool to us!

NITRO-10

Yes, you can stop scrutinizing it now; it's a gas-powered RC10. How was it done? Well, Nilo Roman, from San Francisco, CA, sent us this photo of his interesting creation. Nilo grafted parts from a Kyosho Sandmaster (transmission, suspension arms and gas tank) to make the conversion. Other mods include an OFNA .15 engine with a recoil starter, an MIP stinger pipe and a HPI Astro Super Van body. Nilo's ride is controlled by an Airtronics XL2P radio. According to Nilo, the car is light, and it really gets up and goes! With a .15 in there, we don't doubt it!



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

PULLIN' TIME

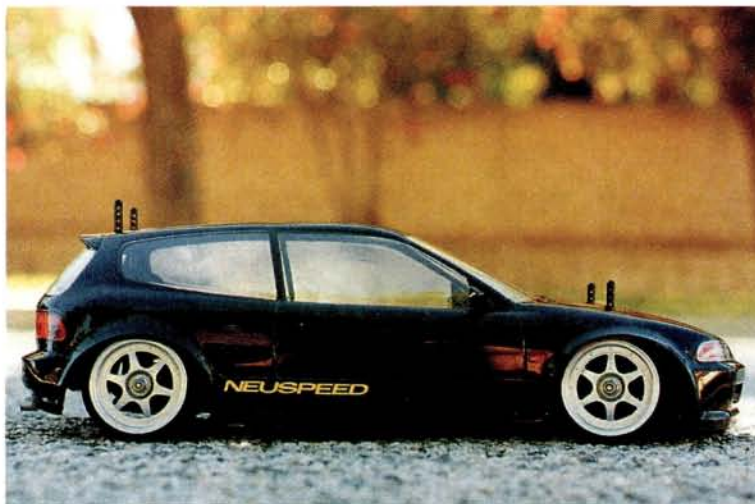
This wild-looking creation comes to us from Michael Gross of Laurel, MD. Michael's pulling tractor, aptly named "Pullin' Time," was scratch-built out of brass tubes soldered together. The fenders are made of balsa and fiberglass. It has six Parma Hemi engines on board with scratch-built headers, and it sports Clod Buster tires that were custom-cut for pulling. Inside, you'll find a 7-cell battery pack and a Fantom bushing stock motor, Futaba radio gear, a Tekin 420 G2 ESC and a custom-built gearbox with a 175:1 reduction. It pulls in the Bar Tire Sportsman class, where it has finished in the top five. It has also won many concours events at NR/CTPA national and world events and awards for best chassis and gearbox design.



READERS' rides

LOT LOSI

This wild-looking Team Losi Double-Xt belongs to Justin Davenport of Irvine, CA. Justin races in the Gyro Hobbies parking-lot races in El Toro and, apparently, his truck is usually the one to beat! It's modified with a 13-turn single modified motor, a Tekin 411G ESC, an Airtronics CS2P radio, 1700mAh SCRC cells and Pro-Line Road Hawg tires. Justin's Dad, Rick, painted the body for him—not bad for only his second time using an airbrush. It looks great, Justin. Keep up the good work out on the local lots.



SPORT COMPACT CAR

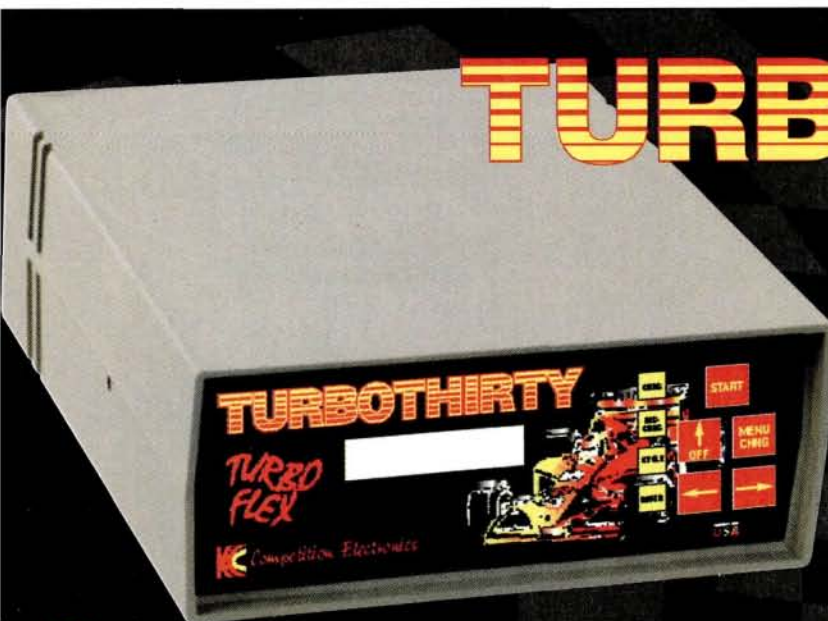
This stylin' Civic comes to us from Joel Kopelioff of Granada Hills, CA. Joel painted the body black and got the Neuspeed automotive stickers at a local auto-parts shop. He modified the car by adding a Tamiya hop-up chassis and HPI lowering kits (front and rear). Power comes from a Tekin P-12 speed control and a Trinity Topaz (11-turn triple) modified motor. An Airtronics Rival Sport radio system controls the package.

TURBOTHIRTY

Check these hi-performance features

- **Complete battery charge with reapeaks** gives consistent, reliable charging every time without false peaks. Set initial charge amps and reapeak amps at different values. Set the peak detect drop back voltage for amount of battery pack warm-up.
- **Turbo flex your batteries** to lower cell impedance. Reconditions new vitality into older cells.
- **Cycle or discharge your packs at up to 30 amps** For 1, 4 and 6 cell packs. Up to 25 amps for 7 cells. This feature also eliminates discharge resistors and bulbs. It is great for indicating how much run time was left in your pack.
- **Save set in values** in power down memory so you don't have to punch them in the next time you power up.
- **Internal cell resistance** is given for packs and single cells. An optional hi-amp single cell battery box is offered for easy cell matching.
- **Save carrying space and clutter** by eliminating a voltmeter, charger, discharger, motor run battery and a fan.
- **Run your comm lathe or brush in brushes** by using the motor feature. Eliminates the need for separate supply.
- **Discharge time matches purchased batteries.** Since competition electronics makes the industry standard TURBOMATCHER, you can be guaranteed that the readings get from the TURBOTHIRTY match the label readings on your purchased cells.

TURBO FLEX



Competition Electronics

3469 PRECISION DRIVE • ROCKFORD, IL 61109
(815) 874-8001 • FAX (815) 874-8181

The Winning Difference
TURBOTHIRTY

Made in the
USA



Upgrading your connectors

By far, the cheapest, easiest upgrade you can make to an R/C car or truck—on-road or off-road—is to swap the stock Tamiya-style and bullet-type connectors on your battery, ESC and motor for a more efficient connector system.

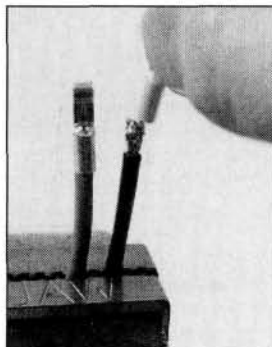
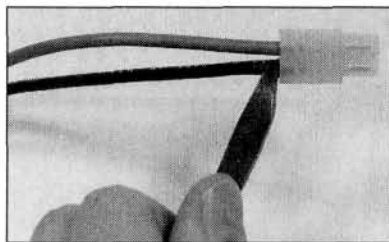
Many companies produce connectors that are as efficient as the wire to which they're soldered (see chart). Getting the juice from the battery to the speed control and then to the motor with as little energy loss as possible is key to long run times.

There are many types of connectors that boast low "on" resistance levels, but some are easier to use than others. Finding a low-resistance, user-friendly connector is important. I recommend Deans*, AstroFlight* and Race Prep* connectors, because they offer incred-

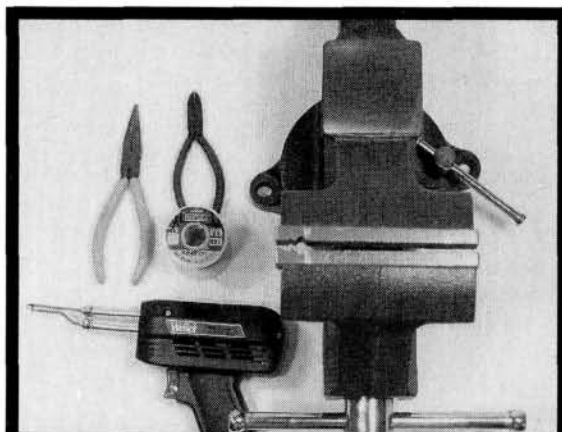
ibly low resistance and are easy to install. Litespeed* Super-Con connectors also offer super-low resistance, however, they can be a bit tricky for beginners to install. For this reason, I've dedicated this month's column to showing you how to change from Tamiya-type connectors to Litespeed Super-Cons.

STEP 1. Remove the old connectors. If you're cutting connectors off a battery pack, make sure the pack has been completely

discharged, and cut only one wire at a time. Do *not* cut both wires simultaneously; cut one wire, then complete through Step 4 before you cut the second wire. This will prevent unnecessary shorts.



STEP 2. Size up the wire. After you cut one wire, hold it so that the end doesn't touch any metal in your work area. Then strip the insulation back about 1/8 inch. Twist the wire's end so that all the strands are tightly twisted together. Slip the metal portion of the connector over the wire. Make sure all the wire strands are in the connector and not hanging out; every strand counts. If the fit is tight, leave the connector on; if the fit is loose, remove the connector and tin the end of the wire



TOOLS OF THE TRADE

To replace your connectors, you'll need a few tools, including wire cutters, needle-nose pliers or a bench vise, a soldering iron with at least 40 watts of power and a good-quality solder.

with solder. Don't use too much solder for this process; go lightly. If you glob the solder on, you won't be able to get the connector back over the wire.

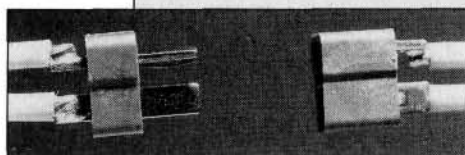


LOW LOSS LEADERS

Connector	Voltage Drop @ 35 Amps	Resistance	Heating
Bullet-style motor connector	0.012 volt.....	0.0012 ohm	Hot
Tamiya-style battery	0.033 volt.....	0.0033 ohm	Very hot
Race Prep.....	0.013 volt.....	0.0013 ohm	Warm
Deans Ultra Plug.....	0.009 volt.....	0.0009 ohm	Warm
Sermos.....	0.010 volt.....	0.0010 ohm	Warm
Litespeed	0.010 volt.....	0.0010 ohm	Warm
AstroFlight	0.011 volt.....	0.0011 ohm	Warm
4 inches of 14-gauge wire	0.010 volt.....	0.0010 ohm	Warm

This information was taken from John Rist's article, "Connector Inspector, Part 2" in the September '95 issue of *R/C Car Action*.

The Deans Ultra Plug offers the lowest voltage drop and lowest resistance; in fact, with a proper solder joint, it's as low as the 14-gauge wire. Getting any better than this would be like improving on perfection!





QUESTIONS & ANSWERS

Q What does resistance have to do with power loss in connectors?

A The higher the resistance, the less voltage can flow through the connector. $E = I \times R$. "E" is voltage; "I" is current; and "R" is resistance. The average 6-cell pack can produce 7.2 volts and 1400mAh, or 1.4 amps for one hour. So, if your pack is supplying 1.4 amps through a connector that has .1 ohm of resistance, then the voltage loss (E) across that connector will be 1.4×0.1 , which equals 0.14 volt. So, instead of your 7.2V pack delivering 7.2 volts to your motor, it will only deliver $7.2 - 0.14$, which equals 7.06 volts. But notice how as the voltage loss gets less, the closer the connector resistance gets to zero. Say your connector has a resistance of .01 ohm; your voltage loss will be only 1.4×0.01 , which equals 0.014 volts, and your pack will deliver $7.2 - 0.014$, which equals 7.186 volts—a big difference.

Q I'm just starting out in gas-powered R/C. What's the deal with 10-percent through 50-percent-nitro fuel?

A The higher the nitro percentage, the more power you will get out of your engine. But before you buy the highest-nitro-content fuel you can find, consider this: the higher the nitro content, the shorter your engine's life. In other words, higher-nitro-content fuels tend to make the engine run hotter, and that means the piston and sleeve will wear out more quickly. Twenty-percent-nitro content is plenty for racing, and if you plan to bang around in the yard, 10 to 15 percent is just right.

Q How often should I change the oil in my shocks?

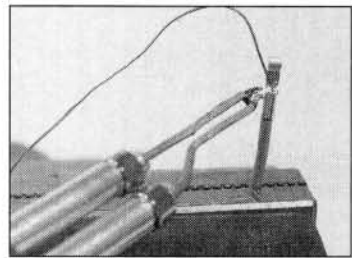
A It depends on how hard you use them and in what conditions. I change mine once a month, but I don't race every weekend. Many racers change the oil after a day of racing, and some hardcore racers change it after every heat. Again, it depends on how often you race and your level of competition. Thoroughly clean out the shock bodies with motor spray before refilling them with new oil; be careful not to hit the shock cartridges and O-rings with the motor spray!

Q The instructions in my off-road-truck kit say to superglue the tires to the rims. If I do this, how will I change them after they've worn out? Will I have to buy new rims?

A No. To remove worn-out tires from rims, boil the tire and rim in water for 10 to 15 minutes. The heat will crystallize the glue, and you'll be able to remove the tire easily. Allow the wheel to cool before you try to remove the tire from the rim.

STEP 3. Make the connection.

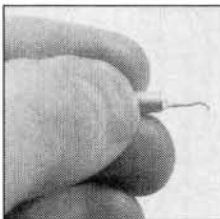
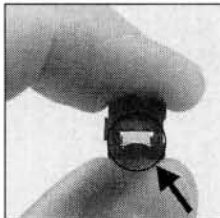
This step requires a vise or needle-nose pliers; a vise is easier to use. You now need to hold the wire with the connector installed and pointing upward. Use the soldering iron to apply heat to the part of the connector that contains the wire. Then touch the tip of the solder to the same part, and let the solder flow down into the wire until you see solder come out the full length of the seam.



STEP 4. Install the connector.

Let the connector cool. Then insert the connector into the housing. Be sure to use a red housing for positive wire (power) and a black housing for negative wire (ground).

Look at the back of the housing, and you'll see a space; the connector must be inserted through this space. Hold the housing so that the space is on the bottom. With the curved portion of the connector facing downward, slide it through the space, and press it all the way in until it snaps into place. If it doesn't cooperate, use a small screwdriver to push on the back side of the connector.



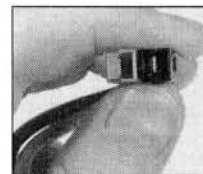
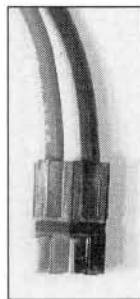
STEP 5. Repeat steps 1 through 4 for the other wire.

STEP 6. Mate the two. Now you should have two leads with two connectors and two housings each—one black and one red. On all four sides of the connector

housings, there are grooves—two male and two female. Match the male groove on one connector with the female groove on the other connector. Slide the two together, and you'll have one connector that has two connections.

The biggest advantage to upgrading your connectors is that you'll no longer experience excessive voltage loss. High-quality aftermarket connectors will pass all the power you can feed them directly to wherever it needs to go with

practically zero power loss. This will add precious seconds—maybe even minutes—to your car or truck's run time. So stop wasting juice, and get connected!

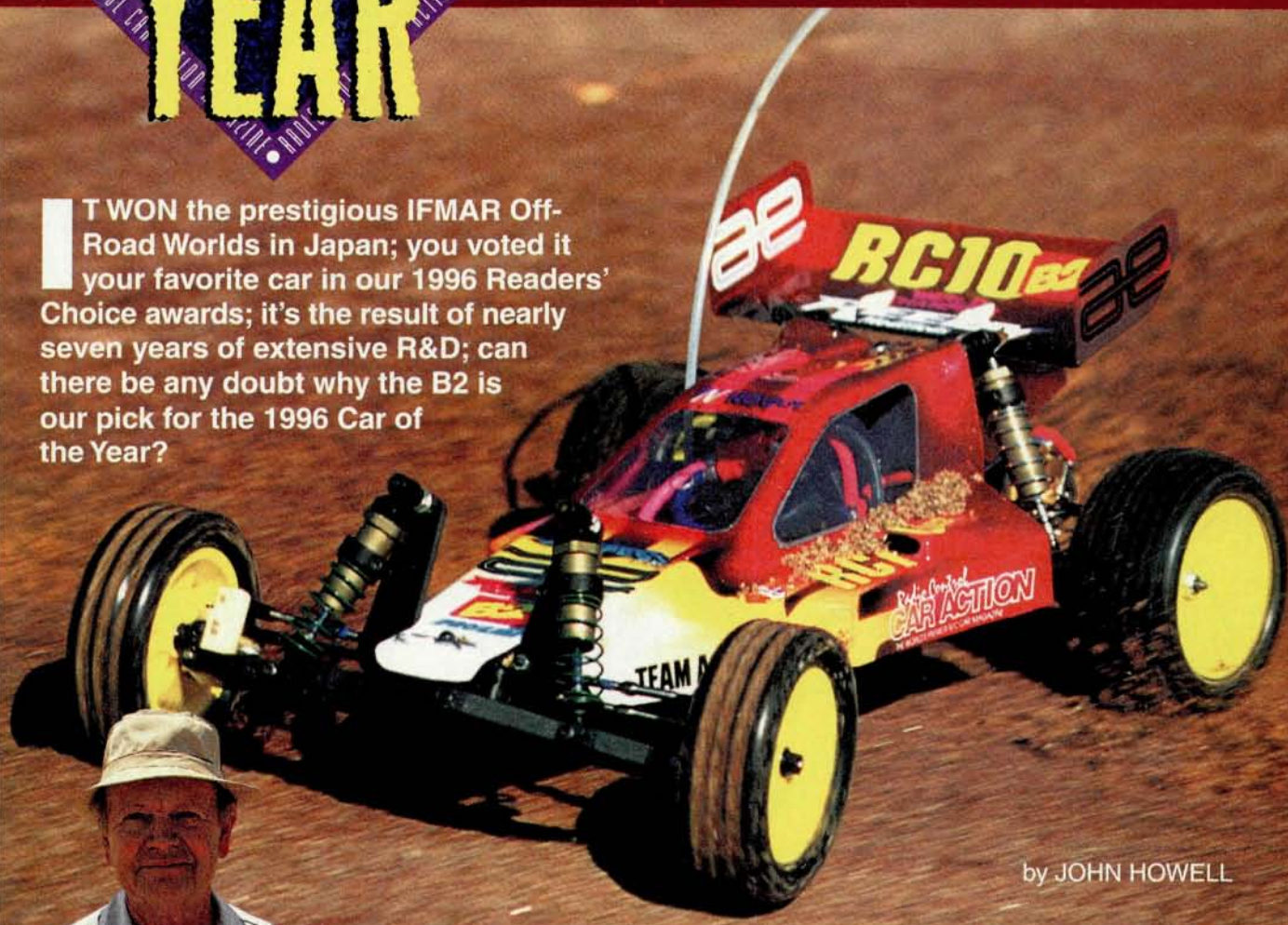


* Addresses are listed alphabetically in the Index of Manufacturers on page 181.

CAR OF THE YEAR

Team Associated's Newest Buggy Takes Top Honors

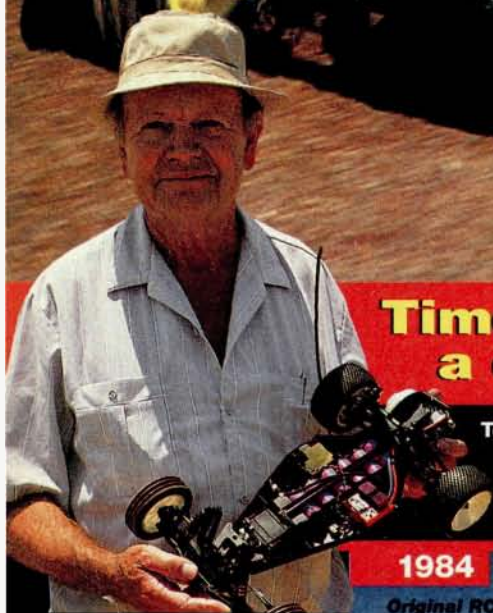
IT WON the prestigious IFMAR Off-Road Worlds in Japan; you voted it your favorite car in our 1996 Readers' Choice awards; it's the result of nearly seven years of extensive R&D; can there be any doubt why the B2 is our pick for the 1996 Car of the Year?



by JOHN HOWELL

Times, they are a changin'...

Team Associated's RC10 has seen many changes over the years. Here's a look back at how the RC10 developed into the car it is today.



Associated Electric's* Gene Husting poses with the B2 at the Reedy Truck Challenge shortly before the car claimed its biggest win—the '95 IFMAR Off-Road Worlds in Japan.

1988

RC10 Graphite



1984

Original RC10



198

Team Associate Horizon TQ1



SPECIFICATIONS

SCALE.....1/10
LIST PRICE.....\$340

DIMENSIONS

Overall length14.625 in.
 Wheelbase10.375 in.
 Width (F)9.875 in.
 Width (R)9.75 in.

WEIGHT (gross, RTR) 3 lb., 6.3 oz.

CHASSIS

TypePlastic "tub" w/metal F/R plates
 MaterialMolded composite/
 hard-anodized aluminum

DRIVE TRAIN

TypeSealed gearbox (2.4:1 reduction)
 PrimaryPinion/spur gear
 TransmissionUniversal-joint drive shafts
 Differential(s)Adjustable ball
 Slipper clutchAdjustable friction
 Bearings/bushings.....Metal-/Teflon™-
 sealed bearings

SUSPENSION (F/R)

TypeIndependent A-arm
 w/upper camber link
 DampingHard-anodized/Teflon™-
 coated, oil-filled shocks

WHEELS

Type (F/R)One-piece-plastic,
 fluorescent yellow

Dimensions (DxW)

—front2.15 x 0.75 in.
 —rear2.175 x 1.375 in.

TIRES

FrontPro-Line XTR-M Edge
 RearPro-Line XTR Pro-86 Flat Stubbie

ELECTRICS.....Not included



Using the new B2, Team Associated driver Matt Francis TQed and captured his first world title at the '95 IFMAR Worlds.

Stealth II transmission features a low 2.4:1 ratio; a larger differential easily handles more torque than its predecessor.

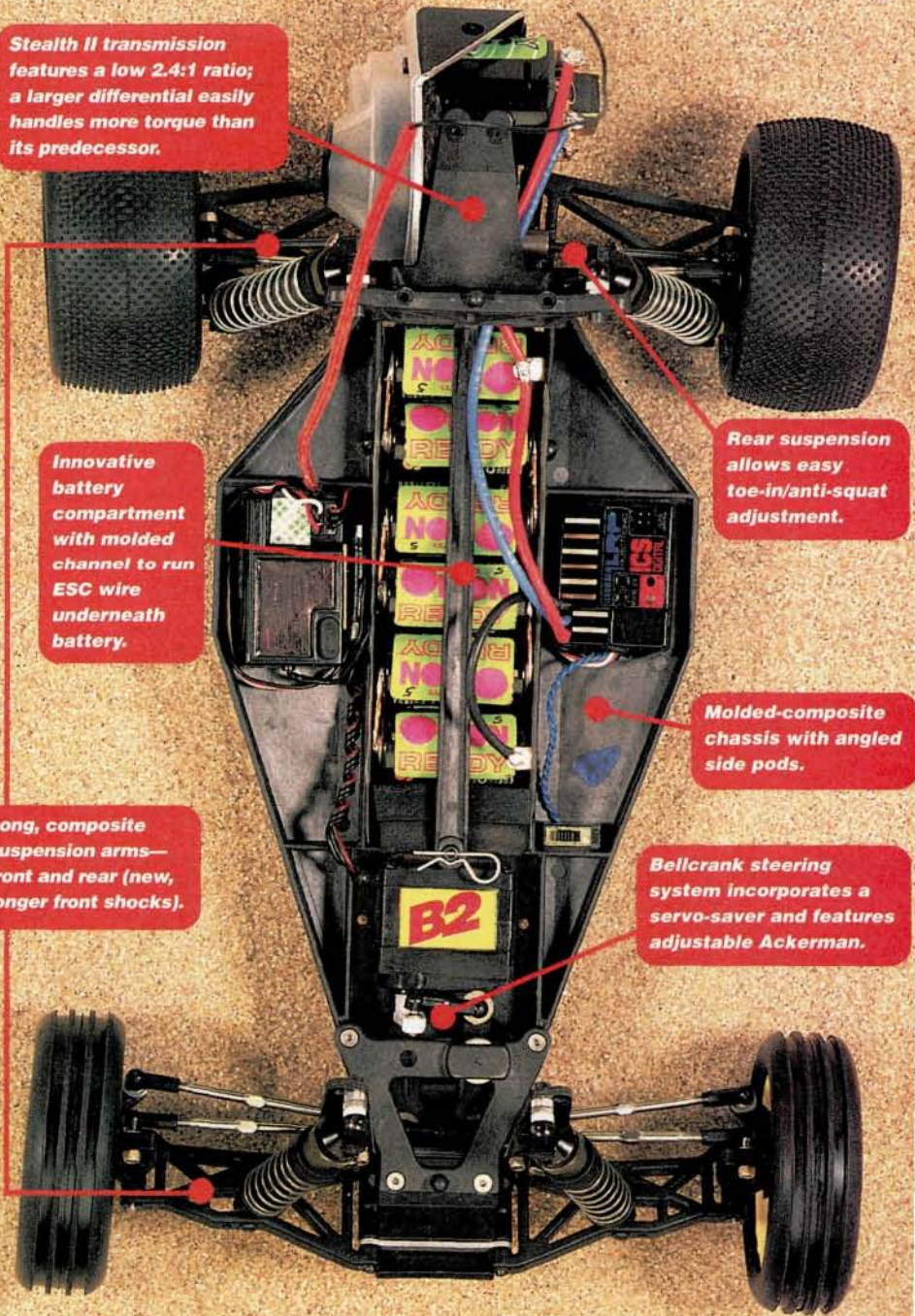
Innovative battery compartment with molded channel to run ESC wire underneath battery.

Rear suspension allows easy toe-in/anti-squat adjustment.

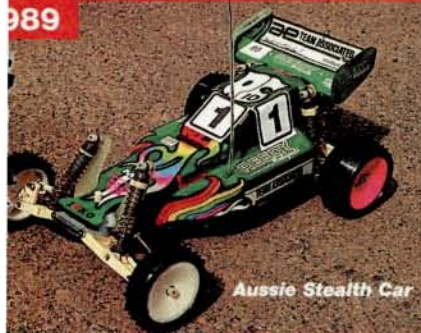
Molded-composite chassis with angled side pods.

Long, composite suspension arms—front and rear (new, longer front shocks).

Bellcrank steering system incorporates a servo-saver and features adjustable Ackerman.



1989



Aussie Stealth Car

1991

RC10 Team Car



1994

RC10 Worlds Car



1990

RC10CE
 (Championship
 Edition)



1991

'91 Stealth Car



1995

RC10B2





The B2's Development— from Concept to Computer to Consumer

by Cliff Lett

The RC10B2 development dates back to the 1989 Off-Road Worlds in Sydney, Australia. The "Aussie Stealth Car"—as it was named by *R/C Car Action*—was slightly more than a long-suspension version of the RC10 Team Car, with almost the same suspension geometry. Most of the chassis parts were made of carbon-fiber panel, and the suspension arms were made of crude, injection-molded parts. The chassis assembly was very rigid, but the suspension components were very flexible.

We were afraid to use rigid, plastic materials, because they were very brittle. Upon returning from Australia, we knew we needed to build a new 2WD car, but the plastic materials that we needed to accomplish our new design were not yet available. Carbon-fiber panel was too expensive to use for production. We also concentrated on building a new transmission, which would be used in our new buggy as well as a new truck to come (the RC10T). Shortly thereafter, we released the Stealth transmission, which became the standard for the industry.

From 1989 to 1994, we experimented with many innovative 2WD prototype designs; each had its own advantages under certain condi-

tions. However, the production RC10 Worlds Car excelled in a wider range of track conditions than many of our prototypes, so we went with that for the next production car. The Aussie Stealth Car was still our best 2WD prototype car, though. We dusted off our Aussie Stealth Car and went to work.

The B2 was designed, molded, tested and optimized using some of the most high-tech computer equipment available. With the help of our Silicon Graphics computer system and Pro-Engineer and Mechanical software, we were able to improve the fundamental design of all the major chassis/suspension components. Words such as "lighter, stronger, more rigid and more durable" are not usually used to refer to products of the plastics industry. But computer optimization and new plastics technologies allowed us to build the car of our dreams.

To the untrained eye, the B2 may resemble the Team Losi Double-X buggy because of the suspension components' triangular design, the color of the plastic and the side-to-side steering-servo placement. But it isn't so. Any correctly designed suspension component will have triangulation. The color black was used for the plastics, because it does not show dirt as much as natural-colored plastics, and it dis-

suades the customer from dyeing the parts, which changes parts dimensionally. Servo placement was borrowed from the early Yokomo YZ-10 car.

The B2 is a combination of what we learned from the Aussie Stealth Car, the RC10 Worlds Car, many days of track testing and fundamental improvements made with the computer. These were among our goals when we started to design the B2.

- Design a car for all driving skill levels—beginner to expert.
- Design a more rigid chassis that is more durable than those on previous cars; incorporate a 'bowl'-shape design with internal ribbing and sloped undersides for super stiffness and roll clearance.
- Make the car lighter by design using new plastics technologies and various components as integral parts of the chassis structure.
- Keep the "wide range" of tunability of the Worlds Car, i.e., a car that can be tuned for beginners and experts.
- Increase low- and high-speed steering without sacrificing stability and jumping characteristics.
- Offer easy assembly and rebuilds.
- Fewer parts.
- Keep it simple.

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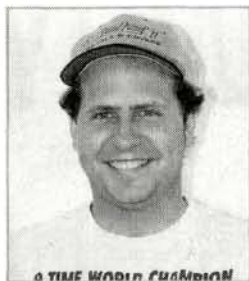
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Pavidis' Impressions

Team driver Mark Pavidis is Associated's number-one gun. Mark has raced many versions of the RC10 throughout his career with Team Associated, and he was instrumental in the testing and development of the new B2. We asked Mark to give us a little insight into the car's strengths and how it differs from its predecessors.

JH: In your opinion, what separates the B2 from previous RC10s?

MP: Well, by far, it's much easier to build and maintain. When you go to a race, you can really see the difference between the B2 and its predecessors. Recently, at the Florida Winter Champs, I noticed the difference. I tore down my entire car to get it race-ready, and it took me only three hours. With my Worlds Car, it would have taken me at least five hours—if not more.

JH: What about handling? How is the B2 different from the Worlds Car?

MP: I'll give you a rough idea of the differences between the two. First, both cars are very fast; the major difference is that the B2 is more refined in almost every aspect. When we did most of our testing, we had three cars: a prototype B2, an at-the-time 'production' B2 and

a Worlds Car. When we put the B2 on the track, it actually felt slow. Then we put the Worlds Car on the track, and we were pitching it into the corners and really driving it on the edge. It was a big surprise when we compared lap times. Both cars were fast, but it was the B2 with the most consistent lap times.

JH: So even though it felt slow, it was faster?

MP: Correct. It was smoother and by far, more consistent. To answer your earlier question: it does handle differently from a Worlds car; it handles better. Because it's lighter, it accelerates harder and lands off jumps without bottoming out as badly. The parts are more rigid than on the Worlds Car, so it feels the same every time you put it on the track. Also, the B2 has more ground clearance than the Worlds Car, so the chassis doesn't scrape on the

ground; the angled sides help when the chassis rolls through turns, and the kicked-up rear motor plate helps prevent the rear end from smacking the ground when the car comes off a jump; it also turns much better.

JH: What part did you play in the B2's development?

MP: I took care of all the test driving. I would take the car out, drive it, and then give my input to Roger, Curtis and Cliff. I also gave Cliff some input when he was designing parts on the computer.

JH: Many racers labeled the older-style Team Cars and Worlds Cars as tight, technical, smooth track cars; how do you think people will categorize the B2?

MP: Through our testing, the B2 has proven that it's just as good as, if not better than, any of our older cars on tight, smooth, technical tracks, and it excels on longer, bumpier tracks; it gives us the best of both worlds.

The staff of *Car Action* congratulates Team Associated on winning "Car of the Year." We know this one was a long time in the making.

**Addresses are listed alphabetically in the Index of Manufacturers on page 181.*

WORLD CHALLENGE 96

USA GRAND FINALS **REGIONAL ROUNDS**
MIAMI, FLORIDA NOV. 8-10
WORLD GRAND FINALS
THE NETHERLANDS
DECEMBER 13-15
Miami, Florida May 17-19
Mesquite, Tx June 21-23
Racine, Wi July 19-21
Ontario, Ca August 2-4
Enfield, Ct September 13-15



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by George M. Gonzalez

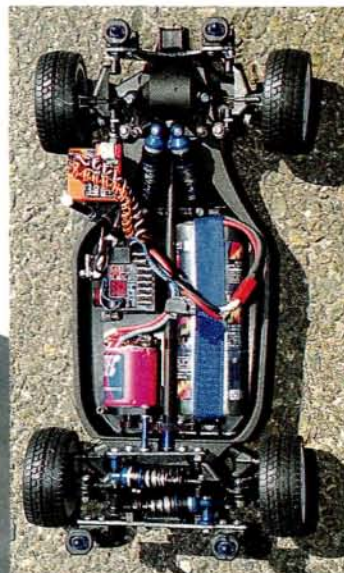
TENTH TECHNOLOGY Predator DTM

I WAS CONVINCED that touring sedans couldn't possibly get any more high tech than they are today—that is, until I caught a glimpse of Tenth Technology's Predator DTM. It's distributed in the U.S. by Maxtec Development*—yes, Maxtec!—the company whose hot motors have been winning races all over the world.

The Predator DTM has unique and interesting features that are sure to make it a favorite among R/C enthusiasts and hardcore racers worldwide. But the important question is: how will the Predator fare against all the other new supercars that are available now? You'll have to read on to find out.

KIT FEATURES

- **Chassis.** The backbone of the Predator DTM is its extremely rigid, molded-resin tub chassis. The chassis will not flex, and this allows the suspension to work more consistently, while providing a safe haven for the drive train and all of your expensive electronics. The underside of the chassis features countersunk screw holes throughout, and the lower suspension-arm's pivot points are recessed for



An overhead view of the exotic rolling racing chassis, which was designed using a CAD process like those used to design full-scale racecars.

Are 2



SPECIFICATIONS

SCALE	1/10
LIST PRICE	\$479
DIMENSIONS	
Length (overall)	17.75 in.
Wheelbase	10 in.
Width (F)	7 in.
Width (R)	7.25 in.
WEIGHT (gross, RTR)	3 lb., 5 oz.
CHASSIS	
Type	Molded tub
Material	Resin composite
DRIVE TRAIN	
Type	Shaft-driven 4WD
Primary	Pinion/spur

Transmission (F/R)	Universal drive shafts
Differential(s)	Ball
Slipper clutch	No
Bearings/bushings	Plastic bushings

SUSPENSION

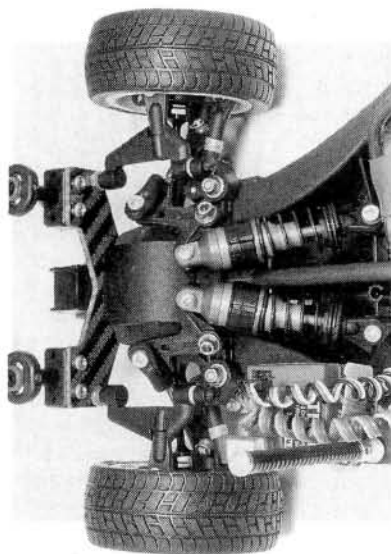
F/R: Type	Upper and lower wishbones
Damping	Hard-anodized, Teflon™-coated, coil-over, oil-filled shocks

WHEELS (F/R)

Type	One-piece plastic
Dimensions	1.875 x 1 in.

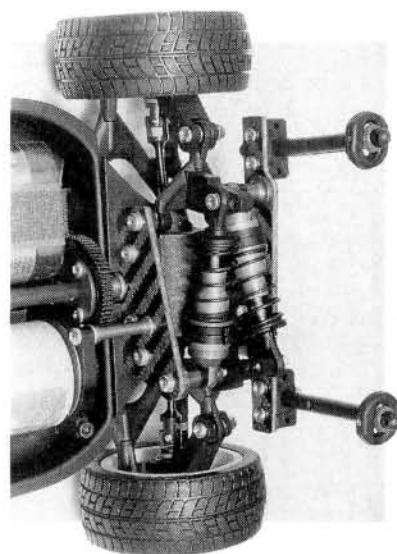
TIRES (F/R)

TIRES (F/R)	Rubber slicks
ELECTRICS	Motor, battery and ESC (not included)



Left: the front end uses a pushrod/rocker-arm suspension system with inboard mounted shocks. Under the sleek body shell of a full-scale F1 car, you'll find a front suspension similar to this. Check out the graphite front shock strut, universal drive shafts and the aftermarket Kose inboard antenna—pretty slick!

Right: the rear end is equally impressive: laydown shocks, graphite shock struts, universal drive shafts and upper and lower wishbones. How sweet it is!



48-pitch spur is attached to a carbon-fiber propeller shaft, and both ends of the propeller shaft mate with the front and rear diffs via internal bevel gears. A complete set of universal swing shafts transfers the power to the wheels.

I was extremely bummed that the entire drive train and wheels are supported by plastic bushings. At the least, a kit of this complexity (and price) should have a few Oilite (metal) bushings for all the critical drive train areas. I installed a complete set of ball bearings right from the start, and I recommend that you do the same. Make

these are arranged in two half spirals—in layman's terms, each ball is offset. As a result, the diff balls do not travel on a single path. They run on several different paths; this means that the diff will stay smooth for a long time and the diff rings will last much longer.

improved aerodynamics.

In the bushing-supported steering-bellcrank system, the bushings could be replaced with bearings for extra-smooth operation. I wasn't impressed by the piano-wire steering rod that connects the bellcrank to the steering servo. This system

hers just PREY for this BEAST?

is used on the Predator off-road buggy; if it could withstand the rigors of off-road racing, it should also

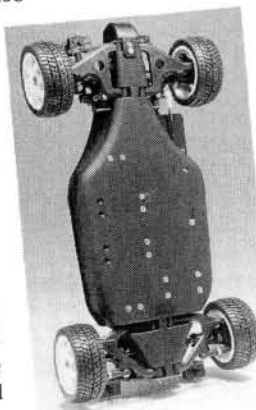
work well on the plan. Because I didn't look in tech like the rest of the car, however, I replaced it with a Kose* carbon-fiber turn-buckle steering rod set (part no. K1200) that was intended for the Tamiya Mini Cooper. I had to cut about 1 inch off the carbon steering rod to make it fit the Predator, but this unit

looks and performs better than the stock unit. While I was at it, I installed a Kose onboard antenna (K1702) to keep my car as scale looking as possible.

• **Drive train.** The Predator DTM features an extremely efficient, shaft-driven, 4WD system with front and rear ball diffs and in-line motor and battery positioning. The motor is mounted on the left side of the chassis on an eccentric motor mount. I really like this feature because it makes it easy to change the pinion gear by loosening just one cap screw. A 70-tooth,

sure you pick up the bearing kit for the steering bellcrank and rocker-arm assembly as well; you'll be pleased with the results.

Man, even the underbelly is impressive. Check out the recessed suspension-arm pivot points and molded tub chassis. Under-the-chassis aerodynamics plays a major role in this car's awesome performance.



Identical front and rear ball diffs come assembled. I took one of them apart to get a better look, and I was pleasantly surprised by what I discovered. The diffs use 14, 3/32-inch balls (most high-quality ball diffs use 12 balls);

• **Suspension.** By far the Predator's most impressive feature is its suspension. The entire suspension was designed using the latest in CAD/CAM technology; the car's roll center is also computer-optimized. Hard-anodized, Teflon™-coated shocks are used on all four corners, and these feature Teflon™-coated shock shafts and pivot balls. In fact, there are 30 Teflon™-coated pivot balls in the kit—pretty trick. Of course, the kit includes several shock pistons to choose from, and that adds to the tunability of the car.

Up front, you'll find that the shocks are mounted inboard, and they resemble the setup that's used on full-size F1 cars. Pushrods are mounted on the lower suspension arms; when the suspension is compressed, the pushrods push up on a set of rocker arms and force them to pivot. One end of the front shocks is mounted on the chassis, and the other is mated with the rocker arms. I replaced

Factory Options

- Ball bearings: transmissions—part no. P-AF1; wheels—P-AF2; rocker arms and steering bellcrank—P-AF3; front and rear diffs—P-AF4.
- Slipper clutch—P-AT11.
- One-way front bearing—P-AT5.
- Lexan undertray—P-AC33.
- Carbide diff balls—P-AT8.
- Carbide thrust balls—P-AT9.



- Firm springs—P-AS16.
- Racing spares kit—P-AC4B (comes with extra wheels, gears, suspension arms, uprights and steering arms).

THINGS YOU'LL NEED

- 2-channel transmitter (a radio equipped with steering dual rates and endpoint adjustments will make dialing-in this car much easier).
- Steering servo (preferably high speed).
- 6-cell battery pack.
- ESC.
- Charger.
- R/C knowledge—this car is definitely not for beginners!

TENTH TECHNOLOGY PREDATOR DTM

the pushrods with a set of 1.25-inch Lunsford* Punisher titanium tie rods because I felt the stock steel units would get a lot of abuse. The suspension works very well, but it will take a lot of trial and error to make it work smoothly (see

the upper wishbones. Again, some trial and error will be needed for smooth operation. There are also provisions for adjusting ride height, camber, antisquat, toe-in/out and overall width. This sedan has one of the most adjustable suspensions available.

Alfa Romeo Lexan body. I chose the Alfa body, and I was really impressed with its details.

I was also impressed by the hard, nylon wing that is bolted onto the trunk lid. The kit's detailed decals allow you to reproduce the Martini DTM racer you see on these pages. No doubt, this is a first-class racecar.

TEST GEAR

I decided to enlist the services of my faithful Airtronics* Caliber 3P transmitter and Tekin* TFM 75 3-channel FM receiver. I also installed a JR* NEH-531 high-speed servo to handle the steering chores.

Joe Maloney, from Maxtec Development, must have a lot of confidence in the new Predator DTM because he sent along one of his company's hand wound, 10-turn triple motors for me to try. The first question that came to my mind was "Could this car handle so much power?" Well, I guess you'll find out, so fasten your seatbelts! They also sent along a more conventional, hand-wound, 15-turn triple and one of their tweaked-out "Pink" stock motors for good measure. For batteries, I used an assortment of Trinity* EX-Tech cells. I used Panasonic 1800mAh cells for the 10-turn rocket engine, Sanyo 1700s for the 15-turn motor and Sanyo 1400s for the stock motor.

For power management, I decided to try out an LRP ICS digital speed control it's distributed by Associated Electronics*. I'd had this ESC lying around for months just waiting for the right project, and I felt the Predator DTM was worthy of it.

PERFORMANCE

With my Predator, some tools and about seven battery packs, I headed to a large college parking lot near my house.

I first installed the Maxtec "Pink" motor a 29-tooth pinion gear and some 1400mA cells. I performed a few maneuvers to get a

THE COMPETITION

	Tamiya TA02RS	Yokomo YR-4SPORTS	HPI RS-4	Kyosho TF-2	Tenth Technology Predator DTM
Wheelbase	10.88 in.	10.25 in.	10 in.	10.28 in.	10 in.
Width (F/R)	8.65 in./9 in.	7.13 in.	7.81 in./8 in.	7.75 in.	7 in./7.25 in.
Weight	3 lb., 5 oz.	3 lb., 3 oz.	3 lb., 5 oz.	3 lb., 7.5 oz.	3 lb., 5 oz.
Diff type (F/R)	Gear/ball	Ball	Ball	Gear	Ball
Chassis	Plastic	Fiberglass	Fiberglass	Aluminum	Resin composite
List price	\$320	\$190	\$288**	\$199.99	\$479
Available at*	\$192.99	\$120	\$194.99***	\$149.99	\$320
Reviewed in	To come	To come	5/96	1/96	7/96

*Prices vary with location.

\$298 with body; *\$199.99 with body.

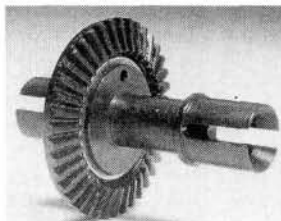
"Building and Setup tips"). The front suspension is also completely adjustable; caster, camber, toe-in/out and ride height can be altered easily.

The rear end is equally impressive. The rear shocks are installed in a laydown configuration; this lowers the center of gravity considerably. One end of each shock is mounted on a graphite shock tower (there are two rear shock towers—one for each shock) and the other end is mounted on posts, or shoulders, that are mounted on

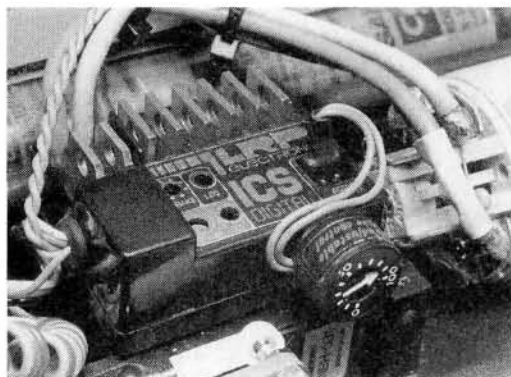
• **Wheels, tires and body.** On all four corners, you'll find a set of blue-anodized, aluminum wheel hubs that will accommodate Tamiya* and HPI* wheels.

I was impressed with the stock wheels and tires. The tires are the gummy, slick kind, and they provide incredible traction on high-bite tracks. The white, 8-spoke wheels are also pretty trick, and they seem to be more rigid than most of the sedan wheels I've used. Because the parking lots out here in Connecticut are usually sandy and dusty, I replaced the stock tires with a complete set of HPI Super Radials; these have treads, and their soft compound will hook up nicely on our dusty parking lots.

The Predator DTM is available with either an Opel Calibra or an

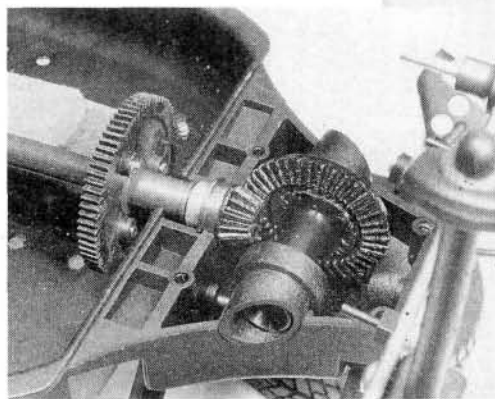


The bevel-gear ball diffs are unique. Inside, you'll find 14 offset balls that skate across the rings on different paths. This adds life to the rings and keeps the diff running more smoothly for longer.



The mighty LRP ICS digital speed control was just as impressive as the car—silky-smooth throttle response, cool operation, long run times and the best braking system I've ever tested. Check out the cool detached torque limiter. I also used a JR NEH-531 servo, which worked flawlessly.

The front and rear bevel-gear ball diffs are identical; the drive train is simple and efficient. On other sedans, the carbon-fiber drive shaft is an expensive option.



y trims in order and then hit the throttle to see what this car would do. I was amazed at how fast it got up to top speed. I noticed, however, that whenever I tapped the brakes to go into a turn, the car had a serious hooking problem. I tried to loosen the rear end by installing some Kamiya Yellow tuned springs, but the problem got worse.

I took Joe Maloney's advice and filled the rear shocks with 40WT oil, leaving the 30WT in the front; this tightened the rear. It's an unusual remedy for a hooking problem, but who am I to argue with success? I put the kit's stock springs back on, and I set up my LRP ESC on the "smooth brake" setup. I moved the brake-adjustment pot on the ESC all the way to the left and limited the maximum brake power by adjusting my throttle endpoint adjustment (EPA) on my Caliber 3P.

LIKES

- Incredible, off-the-line punch and "ballistic" top speed.
- Extremely high-tech design.
- Exceptionally high-quality materials throughout (graphite and blue-anodized hardware everywhere).
- Super-efficient drive train with front and rear ball diffs.
- Price includes highly detailed Alfa Romeo body with decals, wheels and tires (optional on some other high-end sedans).
- Highly tunable suspension.
- Quick-release motor mount.
- Teflon™-coated shocks, shock shafts and pivot balls.
- Very distinctive sound. This car whines and screams when you hit the throttle.

DISLIKES

- Instructions aren't always clear.
- Kit doesn't include shock fluid, diff lube, or tools.
- Plastic bushings throughout.
- High price.
- Suspension needs additional fitting to work smoothly.
- I'm convinced this car may be too cool for some racers!

Originally, I had set the brakes at 150 percent; now I lowered them to 100 percent. When I drove the car, I noticed a vast improvement. I continued to reduce the EPA a little at a time until I arrived at 45 percent and found that the car's hooking problem had been corrected.

I was now able to go into a corner fast and furious, tap the brakes going into the

When I opened the box and sifted through the parts, I realized that many of them were unfamiliar to me, even though I've worked with many different R/C kits. From that moment, I knew this car was going to be a challenge to build. Here are a few tips that should help you assemble the kit and get you dialed at the track.

• **Step 1.** Make sure you trial-fit the propeller shaft in the chassis before you glue the prop-shaft couplers to the carbon-fiber propeller shaft. There should be slight horizontal play on both ends. Once you've installed the diffs and the gearbox covers, you'll notice that there is also some vertical play; this is OK. The play is built in to protect the drive-train bearings when the car rides over ruts or smacks into a curb.

• Place a small amount of lube on the teeth of the front and rear bevel-gear diffs. Because the diffs come assembled, you'll have to supply your own lube or moly grease, if you have it. I used Aero Car Technology's Super Speed gear lube—a product I highly recommend.

• **Step 4.** I had trouble bolting the rear graphite shock tower onto the front of the rear gearbox. Apparently, the mounting holes on the shock tower were a little off, so I couldn't get the shock tower flush on the mounting surface. I enlarged the holes a little, and this allowed the shock tower to fit properly.

• **Step 5.** Study the ball-joint identification chart carefully; the ball joints come in four sizes, and a couple of them look alike (specifically, the "long" and "tough" ball joints; they may look the same, but the "tough" ball joints have longer reinforcing ribs). Each type of ball joint has a call name, as indicated in the instructions; make sure you use the correct ball joint, or you will have serious problems.

• **Wishbones.** The front and rear lower-suspension wishbones are connected to the chassis with somewhat conventional hinge pins, but the upper wishbones are bolted onto the shock towers with pivot pins. Proper mounting of the pivot pins is critical for smooth operation. After you have installed the upper and lower wishbones and axle carriers, check to see whether they pivot freely; ideally, the suspension arms should drop under their own weight. If they don't, you'll have to rebuild them. The shock towers have recessed pivot-pin mounting locations; you may need to carve away some graphite so you'll be able to mount the pins flush with the shock tower (I had to).

I spent long hours trying to get the suspension on my car to work freely, but I could never get the suspension arms to drop under their own weight. Yet I felt the suspension was smooth enough, and when I installed the battery and all the electronics, the suspension actually felt great. I noticed that, after I had driven a few battery packs through the car, the suspension had smoothed out on its own; I guess the pivot points just needed to be broken in.

Building & Setup Tips



• **Step 15.** The instructions direct you to install the front-suspension pushrods in the middle hole on the rocker arms. I noticed, however, that the upper ball joint was rubbing against the upper wishbone when installed this way. For clearance, I used my Dremel® tool to grind off some material from the upper ball joint. I later talked to Maxtec team drivers about this; they told me that all the drivers mount the pushrod through the upper hole. I did the same and noticed that the suspension actually worked better.

• **Step 17.** The instructions direct you to install the front shocks upside-down. I installed mine right-side-up by mistake and found that they worked the same. I again talked to a Maxtec team driver, who told me that it didn't make any difference. I left the shocks mounted right-side-up because this makes it easier to change the spring pre-load spacers.

• **Step 21.** The battery pack is held in place by four battery-location moldings that are secured to the chassis with screws; a Velcro®-brand fastener strap secures the battery to the chassis. The pre-assembled stick packs don't fit very well because of the moldings. I removed the two battery-location moldings on the right side (outside) of the chassis and found that the battery fit much better.

• **Setting the tweak.** Although the instructions don't mention anything about tweak adjustments, I found it necessary to make them. To set the front tweak, place the car, with all the electronics installed, on a flat surface. Place the point of a sharp hobby knife dead center on the front nose cone/bumper, and slowly raise the car. Ideally, both tires should be lifted off the surface at precisely the same time. If the left front tire lifts up before the right tire (or vice versa), lengthen the left-suspension pushrod a little (or shorten the right pushrod a little), then repeat the process. Keep lengthening or shortening until both tires leave the surface at the same time. The rear tweak is done the same way, except that you'll need to shorten or lengthen the ball joints that are attached to the shocks. I strongly recommend that you take the time to set the tweak because it will make a monumental difference to the way the car performs at the track.

• **Setting the shocks.** The kit doesn't include any shock fluid, and its instructions don't tell which weight of shock oil to use. Maxtec suggests that you start off with the shock pistons recommended in the instructions and that, initially, you fill all four shocks with 30WT oil; however, many team drivers set up the front shocks with 30WT and the rear shocks with 40WT oil, and they install the optional "firm" springs on the rear shocks only. I am told this helps prevent hooking; this didn't make sense to me until I drove the car. Trust Maxtec; it works.

TENTH TECHNOLOGY PREDATOR DTM

turn and accelerate gradually until the car approached the exit; then I buried the trigger. Wow! The car felt dialed. I ran through three packs before I decided to switch motors, then I installed the 10-turn triple because I wanted some excitement. I dropped five teeth on the pinion because I didn't want to risk overgearing the motor. I also didn't want to blow up the car's drive train, so I lowered

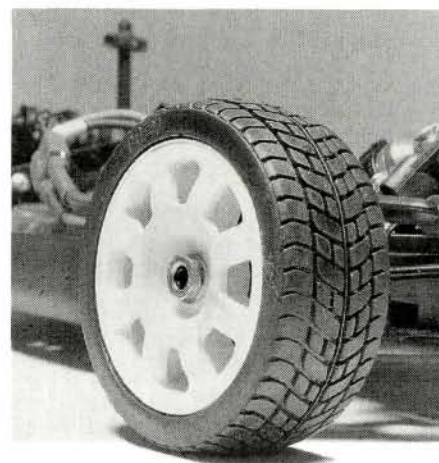
my ESC's current limiter to 60 amps.

I couldn't believe my eyes when I squeezed the trigger. The front tires looked as if they actually left the ground. This car must have topped out at around 50mph! The word "ballistic" doesn't do justice to the car's speed. I didn't try any hard cornering with this setup because I was afraid that the car would end up in an extended barrel roll, and I didn't want to destroy it before our racing season actually started. I was as impressed with the LRP ESC as I was with the car. After running four straight battery packs and a 10-turn motor, the heat sinks were barely warm—outstanding!

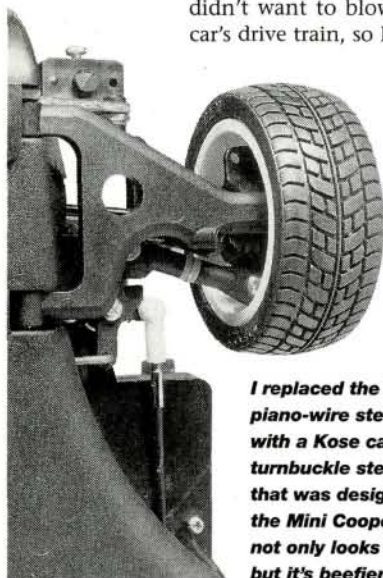
The next motor I tried was a custom-wound Maxtec 15-turn triple. I installed a 27-tooth pinion gear and found it to be the perfect gearing for the wide-open parking lot. The car was extremely fast, and it handled superbly, and gave me long run times. What more could I ask for!

FINAL THOUGHTS

Although the Predator DTM is not intended for beginners, it will reward experienced racers with its state-of-the-art features. Its high cost may limit its popularity, but when you consider all the hot features you'll get for your money, you'll realize that the Predator is



I replaced the awesome stock slicks with a set of HPI super radials, because I needed more grip to hook up on dusty surfaces. Check out the cool, 8-spoke wheels; their hubs are the same size as those on the popular Tamiya and HPI wheels, so you'll always be able to find wheels to fit this car.



I replaced the long piano-wire steering arm with a Kose carbon-fiber turnbuckle steering arm that was designed for the Mini Cooper. The unit not only looks "trick," but it's beefier, too!

a bargain. Because the car is extremely fast, and it handles incredibly well for a narrow chassis sedan, it definitely has what it takes to do battle with today's high-tech touring sedans.

*Addresses are listed alphabetically in the Index of Manufacturers on page 181.

*Oval Masters
Champion*

WOOD RACING

X-13

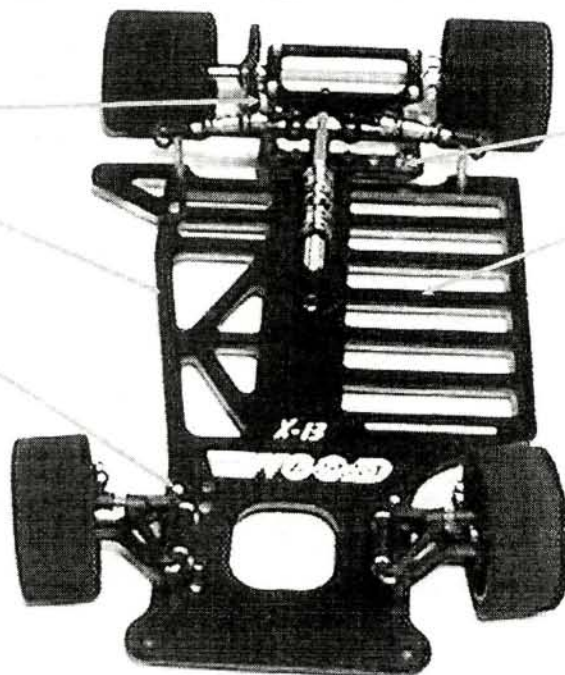
Right or left drive just
by changing axle & hub

0.110" thick quasi-isotropic
graphite chassis (extra stiff)
Introduced 1990

Offset Front End
Introduced 1991

With several companies coming out
with new oval cars, we thought
we should make sure everyone
knows where the latest technology
originated.

No other car on the market
has dominated races like the
X-13 this past year.



C.S. (Controlled Suspension)
Introduced Summer '94

Extra wide battery slots for
fully adj. weight distribution
Introduced 1991

Can also move battery weight
front to rear with multiple front
& rear end mounting holes

News Flash:

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Crown with his Wood Racing
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CAR ACTION
THRASH
TEST
1/10 SCALE GAS

Bigger, faster and a real head-turner

KYOSHO **SuperTen GP**

by Frank Masi

KYOSHO* IS one of the few R/C car manufacturers whose kits appeal to both hobbyists and full-size-auto enthusiasts. Just look at its new "Nostalgic Series" of 1/10-scale vintage automobiles: Cobras, Ferraris and Corvettes duplicated beautifully in miniature atop realistically proportioned GP-10 (gas-powered) 4WD chassis. Now Kyosho gives us the SuperTen GP—a larger, more capable 4WD racing chassis that's powered by a large-displacement .15ci engine and available adorned with your choice of a Toyota Castrol Supra, a Nissan Skyline GT-R or a McLaren F1 GTR body set.

From its thick, aluminum chassis to its rugged-looking, double-wishbone suspension, the SuperTen more closely resembles full-blown gas racers such as the Serpent* Impact 2 than it does its "little brother," the GP-10.



And as if the implied performance potential of the chassis wasn't enough to convince me to review the SuperTen, when I found out that I could also get a McLaren F1 GTR body set (my favorite, full-size road car!), I literally pushed editors George and Doogie out of the way (don't worry; they'll heal).

KIT FEATURES

While studying photos of the completed chassis, it became evident to me that whoever designed this car had tirelessly studied current gas-racing technology.

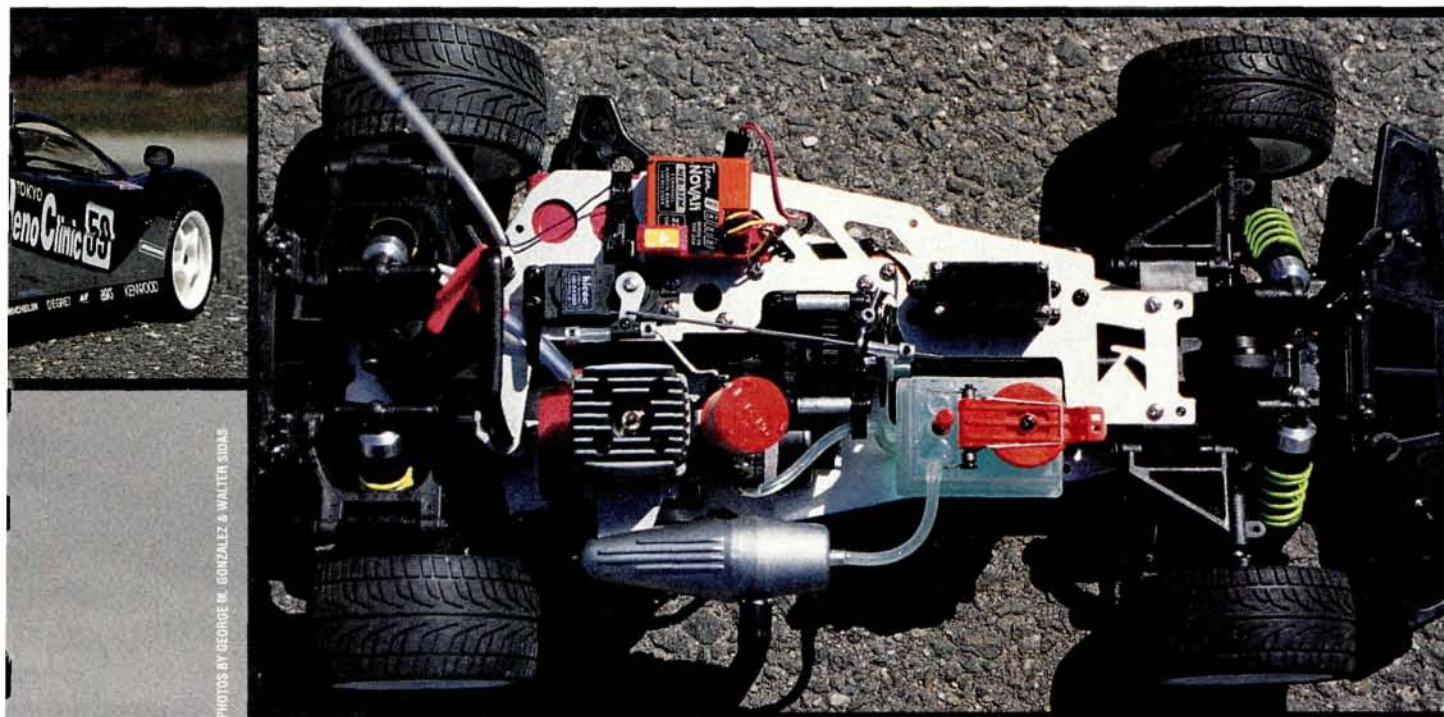
A 2.5mm-thick, gold-anodized aluminum chassis forms a backbone on

which the SuperTen's fully independent and adjustable suspension is attached. The molded-nylon suspension mounts (as well as the rest of the chassis components) are fastened to the chassis using button-head screws. Unfortunately, the screw heads protrude from the underside of the chassis and scrape the ground occasionally. Kyosho does offer an optional "hard" chassis that uses countersunk screws to provide a smooth underbelly for the SuperTen, but it's a costly upgrade.

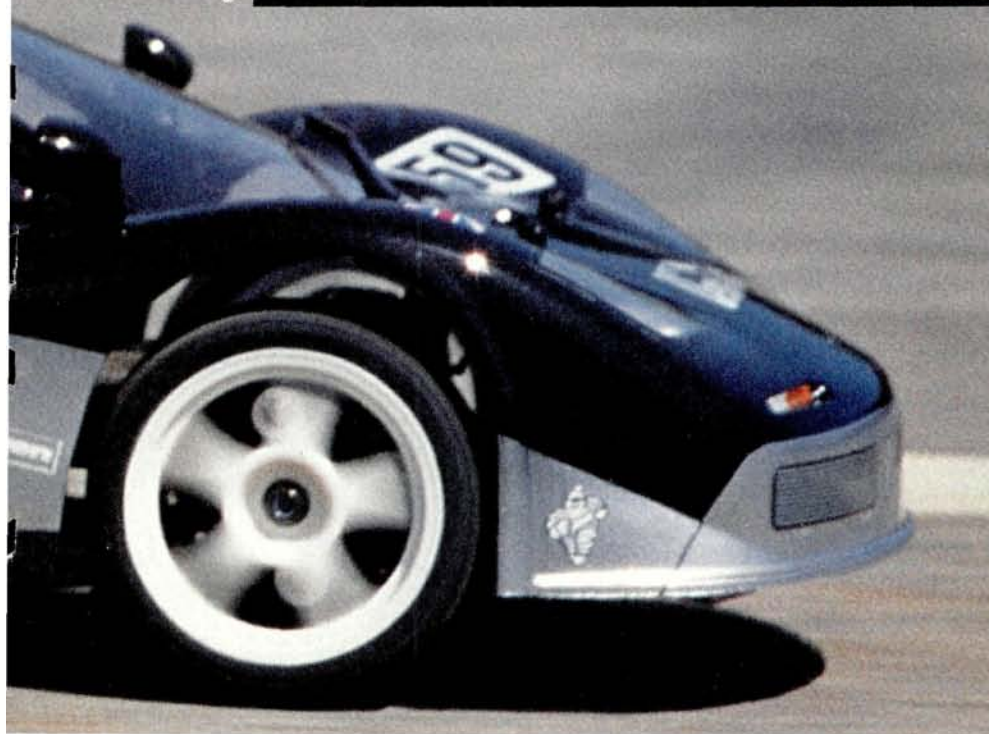
The suspension features upper and lower molded wishbones at all four corners. Up front, the upper wishbone can be adjusted from fore to aft to alter the front

caster angle. In back, the upper wishbone can be attached to the hub in one of two positions to alter roll center. Attaching the wishbone in the upper position increases camber rise, which generally increases rear traction; lowering it tends to provide more steering.

The front uprights and the bottom parts of the rear hubs are attached to the ends of the wishbones with large-diameter, steel pivot balls. This allows incredibly free suspension movement, and you can easily adjust camber (and, to a degree, front width) by how far the pivot balls are threaded into the wishbones. A neat, two-piece swaybar (à la *Serpent*) nestles neatly



PHOTOS BY GEORGE M. GONZALEZ & WALTER SIDAS



"...it became evident that whoever designed this car had tirelessly studied current gas-racing technology."

between the front, lower wishbones and greatly limits chassis roll.

Every corner of the SuperTen's chassis is damped by a large, oil-filled shock. Featuring molded-nylon-composite bodies, steel shafts and aluminum caps, these double-O-ring-sealed dampers come with a variety of shock pistons with which to alter damping. But the included shock oil is too thin to provide adequate damping when used with the recommended pistons. So, you can either buy thicker oil (recommended) or use pistons with smaller holes when building the shocks.

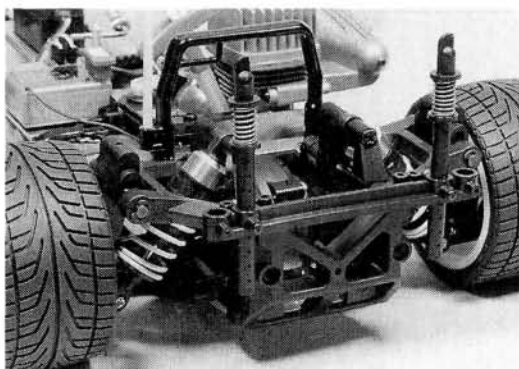
Suspension down-travel (ride height) is not limited by shock length but rather by small setscrews that are threaded through



Twin gearboxes, one tucked between the front-suspension mounts and the other between the rear mounts, are home to a burly set of bevel-gear differentials. Each differential is shaft-driven from a centrally mounted, direct-drive (no differential) gearbox, which, in turn, is driven from the engine by a molded-nylon spur gear. Of note on this arrangement is that the front and rear gearboxes are in direct line with the center gearbox, and that makes for the smoothest and most efficient power transfer. Stopping ability is provided by a stainless-steel disk brake that's attached to the center gearbox's outdrive. The shiny, drilled disk looks really cool, but I think that a conventional fiberglass or composite disk would probably work better.

The whole shebang is tied together by an upper, aluminum chassis plate/radio tray. The plate will fit all popular types of steering and throttle servos, and it even has a little vertical shelf for your receiver. My Novak* NER-3FM receiver was a bit too large to fit it, so I mounted it on the radio tray instead. Most rectangular receivers, however, should fit on the shelf—no prob.

Mounting the engine provides little challenge, because Kyosho has thoughtfully attached the flywheel and clutch for you. The brake linkage is straightforward,



Double-wishbone suspension is found in the rear, too; so are oil-filled shocks and adjustable camber. The upper wishbones' position can be altered to fine-tune the car's steering.

each lower wishbone to contact the main chassis plate. The farther you thread the setscrews, the lower the SuperTen's ride height. This is effective, but when setting the ride height, take care to ensure that down-travel is equal from left to right. If not, the car will "hook" in one direction and "push" in the other when steering.

Building & Setup Tips



The SuperTen comes in kit form. Parts are bagged logically to match assembly steps, but most of the hardware (screws, nuts, washers, etc.) is packaged together, so you'll have to open several bags at once while you're building. For better organization, use a muffin tin or an empty egg carton to hold small parts. The instructions are topnotch and typical of Kyosho—clear illustrations and lots of full-size hardware legends.

■ As when building any gas-powered kit, use medium-strength thread-locking compound,

e.g., Blue Loctite*, on all metal-to-metal connections.

- When assembling the steering arms (Step 1), use the black pillow ball instead of the silver one shown in the illustration. There's an addendum for this step, but I missed it and installed the silver ball, which was too large for the hole and caused the plastic steering arm to crack.
- Be careful not to overtighten the large setscrews that secure the 11mm pillow balls to the steering uprights and rear hubs, or you'll make the suspension bind. Tighten the

setscrews until they touch the pillow balls, then back them off a little a time until the suspension operates freely but with no slop.

- Also, when you adjust the suspension's pillow balls, make sure that the left- and right-side balls are equal distances from the wishbones; if they aren't, one side of the car will be wider than the other.
- Use a high-quality shock-seal grease, such as RCPS* Green Slime, on the shock seals. It will greatly improve the performance of the SuperTen's "sport" shocks and will prevent them from leaking.

SPECIFICATIONS

SCALE SuperTen
LIST PRICE \$499

DIMENSIONS

Overall length 16.9 in.
Wheelbase 11.03 in.
Width
—front 8.69 in.
—rear 8.75 in.

WEIGHT (gross, RTR) 4 lb., 8.8 oz.

CHASSIS

Type Upper/lower plate
Material Duralumin

DRIVE TRAIN

Type Shaft-driven 4WD
Primary 15-tooth pinion (clutch bell)/
44-tooth spur
Transmission Dogbone/axle
Differential(s) Bevel gear (2)
Slipper clutch N/A
Bearings/bushings 8 bearings/8 bushings

SUSPENSION (F/R)

Type Independent double-wishbone
Damping Oil-filled, coil-over shocks (4)

WHEELS

Type (F/R) One-piece plastic "5-spoke"
Dimensions (DxW)
—front 2.25x1.35 in.
—rear 2.25x1.59 in.

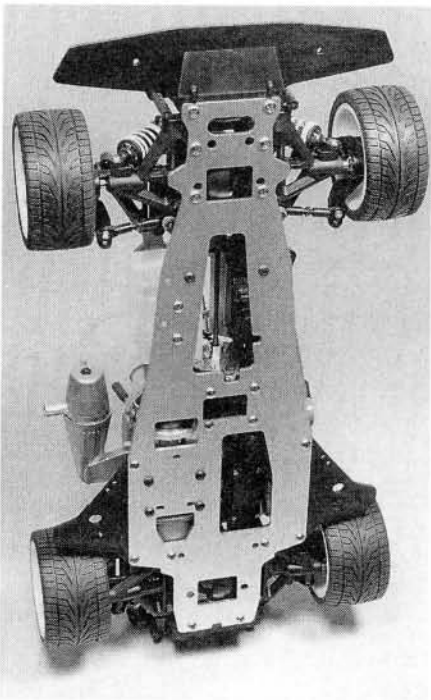
TIRES (F/R) Low-profile street tread
w/foam inserts

POWERPLANT

Engine Kyosho GT-15
Pipe Kyosho "Sports" muffler
Carb Kyosho rotary barrel

SUPERTEN GP

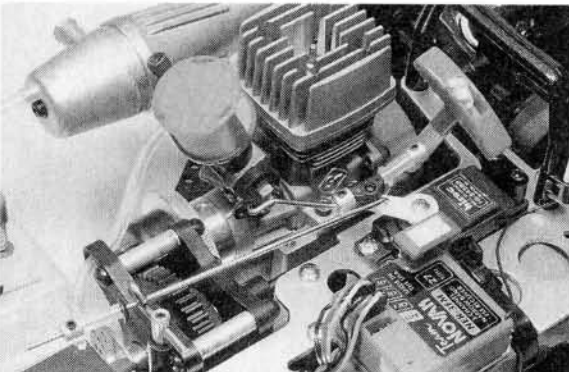
but the instructions with my kit show only the throttle-linkage installation for a .10-size engine (heaven forbid!), so I had to do a little creative linkage bending to accommodate the .15. The .15 breathes into an airplane-type muffler that has a



Top: this underside view shows the SuperTen's duralumin chassis, which provides a rigid backbone for the formidable suspension and helps to dissipate engine heat.

Right: fully independent front suspension gives the SuperTen competition-level handling. Caster, toe-in/out, camber and width can all be adjusted.

Below: the GT-15 provides decent power, but it's somewhat regulated by the sport-type muffler and pull-starter. Add a tuned pipe, and the GT-15 will show its mettle!



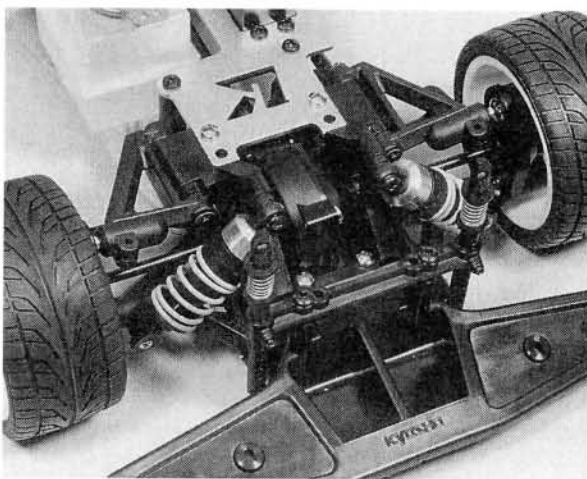
rubber exhaust tube through which expelled exhaust can escape without "spooping" on the bodywork. Number-one modification: ditch the muffler and get a tuned pipe. It's a bit more dough, but it makes a big difference to performance.

The SuperTen's exquisite bodywork represents a higher plateau, even by Kyosho standards. The clear shell features much molded-in detail, and the add-on bits, e.g., headlight buckets, mirrors and wing, set the SuperTen apart from other cars in this class. I have a 1/24-scale, die-cast model of the McLaren F1 on my desk, and a comparison of it and the SuperTen reveal that the Kyosho is nearly perfect in its proportions. It's a beautiful thing!

TEST GEAR

For this project, I chose to use an Airtronics* Caliber 3Ps transmitter and a Novak NER-3FM receiver. For steering, I used an Airtronics 94152 servo (105 oz.-in. of torque and a transit speed of 0.12 second/60 degrees), and for throttle and braking, a Hitec* HS-545BB (ball bearing) servo fit the bill nicely.

To power the onboard radio system, I attached a Dynamite* 600mAh, 5-cell flat pack to the underside of the SuperTen's radio plate. I chose to forego the use of a radio switch, and instead, I simply plug the battery's lead into the receiver port



when I want the radio system switched on.

For break-in and testing, I used Dynamite's Blue Thunder 20-percent-nitro fuel; I also used a Du-Bro* glow-plug igniter to heat the plug element for starting.

PERFORMANCE

Saturday night, in pitch-black conditions outside my garage (actually, I was just trying to get the carb set-

THINGS YOU'LL NEED

- Two-channel radio.
- Four AA batteries for receiver.
- Glow igniter.
- Fuel.

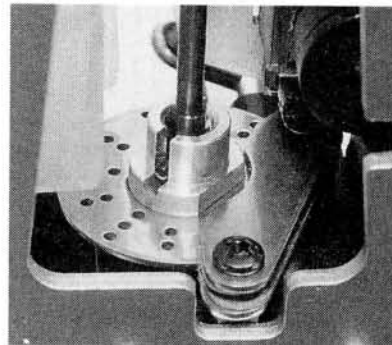


Factory Options

As with all Kyosho kits, there's an extensive list of available

factory hop-ups. These will greatly enhance the SuperTen from "sport" level to full-racing performance.

- Wide-suspension conversion set. A full set of wishbones and drive shafts that widen the SuperTen to racing-type width—part no. FZW-1.
- Hard main chassis (stiffer, and features countersunk holes)—FZW-4.
- Carbon upper deck. Carbon-fiber upper radio plate (stiffens chassis)—FZW-5.
- Two-speed automatic transmission set. Better top speed—nuff said!—39301.
- Tuned muffler. Get more performance from the GT-15 engine.; requires no. 39417 manifold—39416.
- SuperTen ball-diff set; improves cornering and smoothes acceleration—39507.
- Center one-way unit. Allows the front wheels to "free-wheel" for improved straight-away speed and better turn-in—39311.
- Ultimate shock set: metal-body shocks with rubber dust boots for shaft—W-5097.



This close-up of the SuperTen's brake assembly shows the drilled, stainless-steel brake disk and brake pads. Looks awesome and performs well, but a fiberglass or composite disk would probably work better under racing conditions.



LIKES

- **Racing-type, fully independent suspension performs exceptionally well.**
- **Beautiful, highly detailed bodies, wheels and tires.**
- **Very durable and easy to maintain.**
- **Good instructions make construction straightforward.**



DISLIKES

- **Needs a tuned pipe.**
- **Rear tires are too hard to provide adequate traction on paved surfaces.**
- **Should come with a choice of spur or pinion gears for a better ratio for racing on large tracks and parking lots.**
- **No bearings at wheel hubs.**

tings right!): it took me a while to get the engine started because I had accidentally fiddled with the low-/mid-range needle during assembly. With the Kyosho carb, this setting is very critical, and it makes a big difference to the engine's ability to idle. Live and learn.

I got the engine to catch (scaring the bejesus out of my neighbor and her basset hound—ha!), then I let it get up to operating temperature, and I fine-tuned the high-end needle so that an adequate amount of blue smoke was coming out of the exhaust (this indicates a rich setting—necessary for the first three or four tanks of fuel for proper break-in). The temptation was too great, and I threw caution to the wind and launched the body-less SuperTen onto the dark abyss of my driveway. Guiding the SuperTen by sonar, I could tell that it was moving fast by the rise and fall of its engine's note. Sonar then picked up the rustling of grass, followed by the thud of a nylon front bumper hitting rubber garbage cans. No damage! I was thankful, because the next day, I was to meet associate editor George Gonzalez at a nearby go-kart track to not only test the SuperTen, but also to pit it

against his *electric* touring car.

At the track, it quickly became evident that the SuperTen was:

- **Vastly undergeared.** The kit-supplied, 15-tooth clutch bell is obviously intended for use on tight, 1/10-scale roadcourse tracks. If you plan to run this car on a wide-open parking lot, you'll need to gear up or, better yet, go for the optional two-speed.
- **Endowed with excellent suspension.** Nothing at all on the go-kart track could upset the SuperTen's poise. The shocks soaked up bumps that sent George's smaller electric sedan hurtling end over end.
- **Underpowered.** The .15 puts out good power, but to fully enjoy the SuperTen's



The included five-spoke wheels look great. Like the rest of the SuperTen, they're slightly larger than those found on conventional, 1/10-scale road cars. The hard-compound "street"-type tires work well up front, but stickier rears would improve handling.

tric car, which was powered by an "outlaw" stock motor and six cells. The edge in off-the-line acceleration, however, went to the SuperTen, and that further substantiates my theory that the car is undergeared.

Tuning the Kyosho GT-15 engine seemed to require a bit more finesse than with some other engines; setting the idle and low-end mixtures calls for tiny adjustments, and small changes can cause big performance variations. Once set properly, however, the GT-15

was very reliable and didn't need further tweaking.



capable chassis, more ponies are needed. Changing to a tuned pipe, for example, will help matters, as will removing the pull-starter mechanism (the one-way bearing in the starter causes some parasitic drag). In stock form, the SuperTen was barely able to edge out George's elec-

FINAL THOUGHTS

Overall, my impression of the SuperTen is that it's truly a well-engineered, high-performance chassis. It proved itself extremely durable, and its handling was confidence-inspiring. The kit's scale-looking tires (hard rubber compound with foam inserts) are adequate, but handling would benefit from stickier rear tires. Above performance concerns, however, is this kit's beautiful scale appearance. Photos simply do not do justice to the SuperTen. Whether you appreciate state-of-the-art chassis design, or you'd like to have a car that's as impressive on your display shelf as it is on the track, take a close look at the SuperTen.

**Addresses are listed alphabetically in the Index of Manufacturers on page 181.*

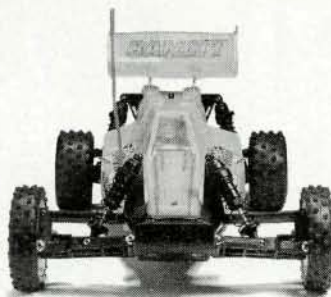
THE COMPETITION		Ofna	Tamiya	Kyosho
		Pirate 10	TGX	Super GP-10
	Wheelbase	10.625 in.	11.75 in.	11.03 in.
	Width (F/R)	9.75/9.125 in.	9/8.75 in.	8.69/8.75 in.
	Weight	3.2 lb.	5 lb., 9 oz.	4 lb., 8.8 oz.
	Diff type	Bevel gear	Gear	Bevel gear
	Brakes	Disk	Disk	Disk
	Exhaust	Header/pipe	Header/pipe	Header/pipe
	Price	\$349.99	\$599	\$499
	Available at*	\$289.99	\$449.99	\$379.99
	Issue reviewed	To come	9/95	7/96

**Prices may vary with location.*



TRAXXAS Bandit

by Josh White



AS YOU FLIP through the pages of this great magazine and read review after review, tech article after tech article, it all begins to sound very complicated. "Building, tuning, tweaking, soldering, adjusting! Aaarghh! How do I do all this?" you may say to yourself despondently. "I need something I can pull out of the box and have fun with!"

Traxxas* has come out with a new sport buggy called the Bandit, and it's based on their best-selling truck, the Rustler. If you're looking for a hassle-free way to get started in the hobby, then you'll enjoy the Bandit.

KIT FEATURES

The Bandit's chassis is molded of fiber composite with a reinforced tub design that includes a molded upper plate to prevent the chassis from flexing. For more stability and fewer flip-overs, the chassis has an extra-low center of gravity that is created by the battery-pack placement. Mounted on the underside of the upper chassis plate is a racing-style steering bellcrank system with supersmooth, slop-free operation. The steering system pivots on aluminum posts supported by plastic bushings that can easily be upgraded to bearings.

The Bandit's A-arms are very sturdy, and resting

PHOTOS BY GEORGE M. GONZALEZ AND WALTER SIDAS



Round up the posse, the
Bandit's on the loose!

SCALE1/10
LIST PRICE\$150 kit/\$260 RTR

DIMENSIONS

Overall length16.18 in.
Wheelbase11.25 in.
Front width10 in.
Rear width9.75 in.

WEIGHT

Gross (RTR)3 lb., 10 oz.

CHASSIS

Type.....Channeled tub with front upper brace
MaterialMolded-nylon composite

SPECIFICATIONS

DRIVE TRAIN

Type.....Sealed three-gear with 2.72 reduction
Primary.....Pinion/spur
Differential.....Metal planetary gear
Bearings/bushingsOilite bushings

SUSPENSION (F/R)

Type.....Independent lower A-arm
with fixed upper link
DampingOil-filled, coil-over, shocks
with plastic bodies

WHEELS

Type (F/R).....One-piece nylon
Dimensions (DxW)
—front.....2.1 x .75 in.
—rear.....2.15 x 1.375 in.

TIRES

FrontAggressive step-pin
RearTriple step-pin

ELECTRICS

Motor20-turn Mabuchi
closed-endbell motor
Battery6-cell battery pack (not included)
Speed control3-speed mechanical



just above them are molded camber links. Fixed links are great for beginners, because they don't have to worry about adjusting them correctly. The downside, however, is that they can't be adjusted at all. If racing is in your future, check out a set of Traxxas turnbuckle tie rods.

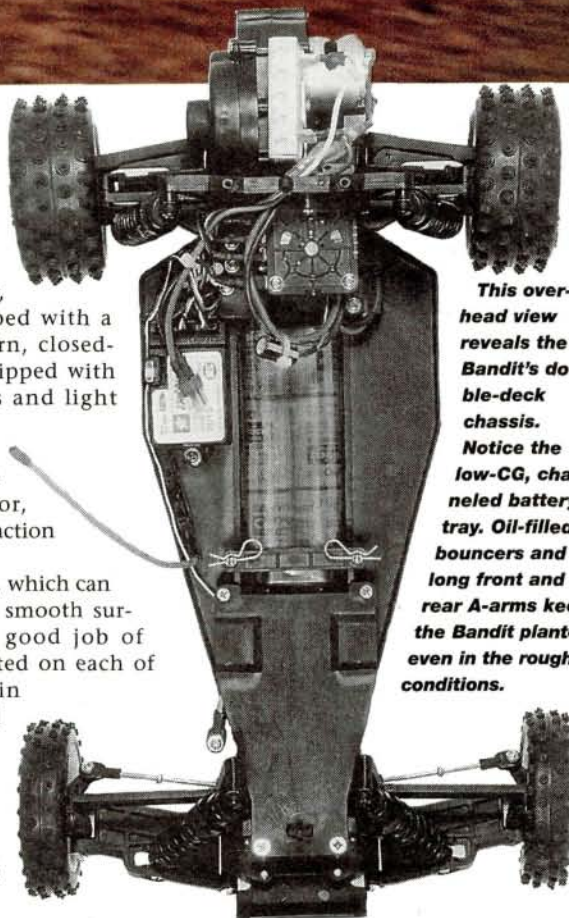
Extra-long, oil-filled, coil-over, plastic shocks are mounted from the A-arms to the molded shock towers. The shock's double O-ring seals hug the shafts securely for leak-free operation, and, inside, the shock caps have rubber diaphragms that prevent the oil from foaming. I really like the Bandit's centered kingpin, live-axle, front suspension. The front axles have drive pins through them that force the axles to spin inside the bushings. This setup improves the car's cornering.

The three-gear transmission has a 2.72 internal-reduction ratio. The internal gears are beefy and should be able to take some abuse, but I recommend that you upgrade to a slipper clutch, which will reduce stress and shock to the transmission and increase its durability and longevity, especially if you install a faster motor. The extra beefy planetary diff with steel gears operates smoothly and should last a long time. Again, if you plan to race, an optional ball

diff is available.

The kit includes a mechanical controller with three speeds in forward and three speeds in reverse. Most entry-level kits come with a 540 motor, but the Bandit is equipped with a high-performance, 20-turn, closed-endbell motor that's equipped with hard-compound brushes and light springs. The 20-turn motor should provide considerably more zip than a conventional 540 motor, but we'll have to see it in action first.

The white plastic wheels, which can easily be dyed, have very smooth surfaces that should do a good job of repelling dirt, and mounted on each of them are knobby step-pin tires that work fine on all but the most hard-packed dirt. For loose dirt, grass and pavement, the kit's tires should be perfect. Topping off the kit is a very slick polycarbonate racing-style buggy body.



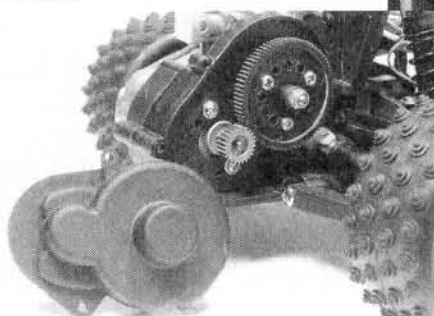
This overhead view reveals the Bandit's double-deck chassis. Notice the low-CG, channeled battery tray. Oil-filled bouncers and long front and rear A-arms keep the Bandit planted, even in the roughest conditions.

TEST GEAR

Because Traxxas had already supplied the radio gear, servos, motor and speed control, all I had to do was plug in my Trinity* 1400 Sanyo SCR Sport Tech battery pack, and I was ready to hit the road.

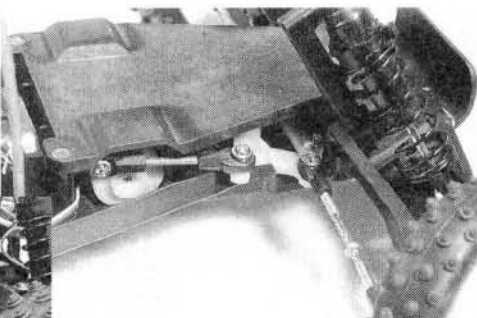
The radical body job was furnished by the ever-artful Lee Griffith of Capstone Hobbies in Westerville, OH. Many thanks to him for his help.

Below: a molded gear cover protects the pinion and spur from dirt and small rocks. An optional slipper clutch is available, which will do an effective job of protecting the internal gears and will also help provide traction in slippery conditions.



PERFORMANCE

My brother plopped the car down in our yard and began to drive it around while I took some shots of it. After several shots, I decided that now we could get it dirty. I took the car to a gravel road near our house and nailed the throttle. It was definitely faster than any other out-of-



Above: the Bandit's racing-style, steering-bellcrank system could be upgraded with bearings for even smoother performance. Check out the large servo-saver—nice touch! Adjustable steering rods are included for easy toe-in/out adjustment.

Building & Setup Tips

I reviewed the ready-to-run version of the Bandit, so it was already 100-percent assembled out of the box. In addition to the tools Traxxas provides, you should have a good pair of pliers and a Phillips screw-driver.

Here are some tips to remember when you disassemble the Bandit for maintenance:

- Work in a clean area that's well-lit and uncluttered.
- Don't work near shag carpet where important little pieces can get lost forever.
- Keep parts in order, and lay them out accordingly so you don't lose anything. Refer to the manual; it's well-written and has plenty of clear photographs and illustrations.
- Keep your car clean; dirt is the enemy of all R/C cars. Dirt can get into bearings, gears and shafts.
- If you plan to race competitively, use superglue to attach your tires to the rims (thin CA works well). Twisty off-road tracks can work the tires off the rims if they aren't well-glued.

THINGS YOU'LL NEED

RTR version

- 8 AA batteries for the transmitter
- Battery charger
- Lexan scissors
- Long-nose pliers
- Lexan body paint and masking tape (if your paint job involves more than one color)
- 6-cell battery pack



Factory Options

The adjustable slipper clutch (part no. 4615) takes the shock out of

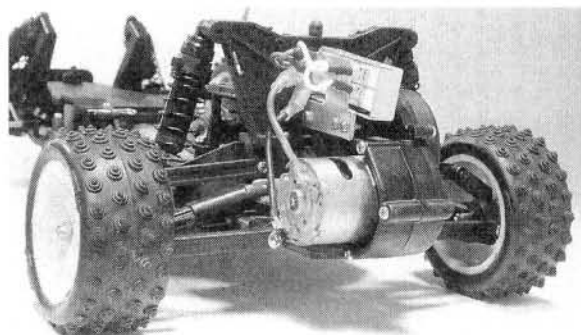
big jumps and improves handling on slick surfaces by limiting wheelspin.

When your kit's bushings begin to wear out and get sloppy, you can add speed and extra run time by switching to ball bearings (part no. 4608—complete set). Bearings last longer and add greater precision to your camber and toe-in adjustments.

Other available racing upgrades include adjustable turnbuckles, an adjustable ball diff, hard-anodized aluminum shocks and Pro-Line* XTR tires. Traxxas offers a whole slew of optional parts and hop-ups for those who want to soup up their cars. Before you fuss with hi-zoot racing upgrades and gadgets, spend your time and money on having fun and kicking up some dirt. Get an extra battery or two, or a faster motor but, most of all, have fun.

the-box sport kit. I drove it around on the road and in the yard, and it handled small bumps and moguls very well. There wasn't much that this buggy couldn't get over. Its cornering abilities were excellent, especially at low to mid speeds. Its suspension soaked up bumps and jumps very well, however, I feel that the front suspension would benefit from increased down-travel. The amount of up-travel is fine.

OK, now I knew it ran well on basic, simple terrain. To really test the car, we built a large plywood jump and set it up where there would be lots of room—on the road. I



The rear end features longer oil-filled shocks, molded upper links, universal sliders and step-pin tires. The included 540 motor has a 20-turn armature, soft springs and hard brushes.

nailed the throttle. The car went a little off center and hit the jump sideways; needless to say, it did a few very impres-

THE COMPETITION

	Tamiya Super Hornet	Kyosho Outrage	Traxxas Bandit
Wheelbase (in.)	10	10.88	11.250
Width (front)	8.18	8.8	10
Width (rear)	8.88	9.63	9.75
Weight (oz.)	51	52.9	58
Diff type	Bevel gear	Bevel gear	Metal planetary gear
Chassis	Plastic tub	Kelron MC	Nylon comp.
List price	\$130	\$120	\$150 (kit)
Available at*	\$80	\$85	\$85
Reviewed in	8/94	8/94	7/96

MC=Molded Composite
*Prices vary with location

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The **HACK ATTACK** is finally here and has already broken several track records across the nation. This latest 24 degree ROAR 96 & NORRCA stock racing motor is in popular demand and the Race Prep factory is building them as fast as we can. Race Prep is proud to be the only motor company to build stock motors in the U.S.A. & because of this we can constantly refine our products. Our R&D Department has discovered something new. The latest improvement made to the HACK ATTACK is the introduction of **HYPERWIRE**. Our **HYPERWIRE** is super low resistance to improve performance with an increase in horsepower and efficiency. How much? The White decal HACK ATTACK has an 8 to 10% average increase in power over the Purple Haze and the Chrome decal HACK ATTACK with **HYPERWIRE** hits 12 to 18% more power!!

Many racers have contacted us about the success they're having with the new motor. Let us hear from you. Thanks for the good comments on the free decal sheet packaged with every motor.



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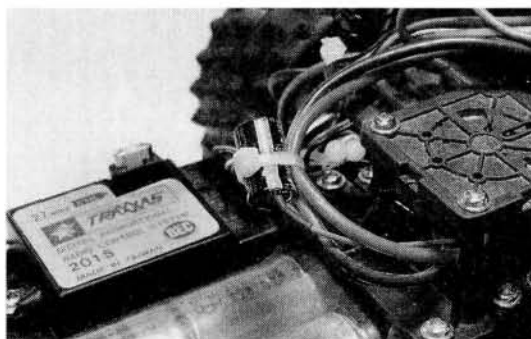
TRAXXAS BANDIT

sive twists in the air. The Bandit didn't sustain any damage (yet, heh, heh!), so I tried again. This time, I slowly accelerated until I hit full throttle. It went straight up the ramp and flew like a bird—about 10 feet—then it smacked hard against the ground. While this didn't break the car, it was obvious that the rear shocks needed more pack for this type of abuse. We tried this aerial maneuver several more times—each with its own uncomfortable landing.

Soon, I noticed that the car sounded strange, so we checked it out. The spur gear was mangled—obviously the result of repeatedly jumping the car as high and as far as we did. (The gear should hold up well under more "normal" conditions.) Fortunately, we had more Traxxas spurs lying around, so we installed another one along with the optional Traxxas slipper clutch. We jumped it some more with no problems. Throughout the day we ran several packs through the car, jumping it most of the time. Damages?—a few. A hair-line crack appeared on the rim, and (don't ask how this happened) one of the front shock caps came off. This was simple enough to fix; we just put more oil in and screwed it back on.

After bashing around awhile, I decided to find out how well the Bandit would handle on a real track. I packed everything up and hauled down to the Columbus RC Racing Club indoor track in Hilliard, OH, where the surface was very dry, hard-packed clay.

With the optional slipper installed, I tossed in my Trinity Sport Tech pack and roared off. The first thing I noticed was how planted the car felt on the track; the traction and stability were truly amazing!



The Bandit includes a rugged rotary speed control with three forward speeds and three reverse speeds. The Traxxas 27MHz receiver has a tremendous range; the impressive radio range is great for running the car in parks and wide-open spaces.



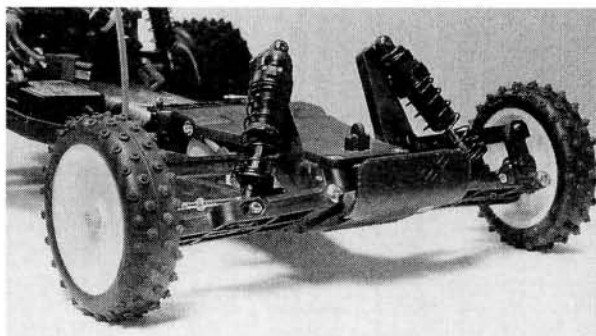
LIKES

- Ready to go right out of the box.
- Easy to work on.
- The captive ball ends won't always be popping off, even after the gnarliest of crashes.
- Stock 20-turn motor is faster than ones most kits come with these days.
- Rock-solid construction.



DISLIKES

- A little heavy, even when compared with other entry-level racers.
- The molded motor mount and guard won't dissipate motor heat as effectively as aluminum.
- Front suspension could benefit from additional down-travel for backyard bashing.



The front end is kicked up for better stability, and a small bumper is included to protect the chassis from mishaps. The oil-filled shocks include clip-on spacers for accurate spring preload adjustment. The molded upper links take all the guesswork out of setting camber. Check out the step-pin front tires; they're perfect for backyard bashing.

There was a little understeer, but that's good for a beginner. No matter how hard I took a turn, I couldn't shake the rear end loose. This is a very stable, steerable car. The only problem was with the bumps and jumps; the car was "shook up" easily, and it handled poorly off large jumps and the nasty triple jumps. More suspension tuning should help in that area in the future. The 20-turn motor supplies plenty of power for the novice racer.

FINAL THOUGHTS

I tested the Traxxas Bandit to its limits and beyond. Every feature has undergone intense scrutiny and extensive testing and, in the end, I can honestly recommend this kit to anyone who wants to start out with a competitive sport buggy right out of the box.

**Addresses are listed alphabetically in the Index of Manufacturers on page 181.*

YOU MIGHT AS well face it: choosing the perfect motor is hard work. Look through the ads in this issue, and you'll see a dozen manufacturers claiming they have just what *you* need. There are thousands of combinations of wind, magnets, timing, bearings, brush composition and springs. So, how do you sift through them all and choose a motor? You'll have to do some homework!

No one can tell you which motor is perfect for you, because your car, track, driving style and environment profoundly affect how a motor will perform. Don't stay up all night trying to choose the perfect motor on your first try; there are too many factors to consider. First, decide whether you want a stock or a modified motor, then consider your driving style. Are you a backyard basher, or a B-Mainer striving for the A-Main?

conditions, stock racers have been known to turn faster laps than modified racers!

Once you have an idea which type of motor you want to run, think about the kind of driving you plan to do.

WHAT'S YOUR DRIVING PLEASURE?

BACKYARD BASHING

For backyard or parking-lot play, you don't have to worry too much about performance, so don't spend too much on your motor. But you probably will want long run times. Inexpensive cars such as those made by Nikko and Radio Shack seem to run all day on a charge; it's sometimes a shock to novices that the more powerful R/C cars and trucks may run for only 4 or 5 minutes on a charge.

HOW TO by Stan VanDruff CHOOSE THE

STOCK OR MODIFIED?

Cost may affect your decision. A stock motor is less expensive, but when it wears out, it will have to be replaced. And it can't be disassembled, so you can't replace worn bushings or true the comm easily. But setup and maintenance are a breeze.

A modified motor costs more, and you can disassemble it to clean it properly, replace the bearings, true the comm, etc. To fine-tune its performance, adjust the timing and, if you want to run a different wind, buy spare armatures rather than a new motor. Would a modified motor be cheaper in the long run? If you plan to race, you'll have other expenses to consider.

If you race a modified motor, you'll need a high-current electronic speed control. Modifieds draw enough current to instantly smoke a mechanical controller. And to be competitive, you'll need good batteries. Modifieds draw more current than stock motors, so it's more likely that your batteries will die (dump) before the end of a race. Your battery investment will far exceed the cost of your motor.

Modified motors have greater acceleration and top speed than stock motors. But during a race, track conditions can limit top speed, and the sheer power of a modified motor can make your car harder to handle. Consequently, modified drivers rarely go more than one lap faster than stock drivers. And under slippery

A stock motor will give you plenty of speed and reasonably long run times. If you want wild wheelspins and jackrabbit acceleration, try an outlaw stock motor (18 to 22 turns), or a budget modified motor (15 to 20 turns). Low-turn modifieds (fewer than 12 turns) are wicked, but they can overstress certain speed controls, batteries and wiring.

PARKING-LOT

These racers include 2WD and 4WD touring sedans and Formula 1 and Indycars. These cars race on impromptu parking-lot courses or beautifully appointed on-road courses. Parking-lot cars are heavier than pan cars (on-road) and don't handle speed as well, so they require motors with lower rpm and higher torque. Parking-lot races usually last 5 minutes, so you'll need a motor that delivers longer run time as well.

This class of racing is the most varied. Some races require spec or handout motors and batteries; others don't have any rules about motors or batteries. (Parking-lot tracks are usually quite tricky to navigate, so your choice of motor isn't all that important.)





OFF-ROAD

These vehicles can use a wide variety of motors. You'll need a motor that provides mild acceleration, but not so much that you have trouble with wheelspin. Don't be too concerned with high rpm, because the straights on most off-road tracks are too short for you to reach high speeds. Off-road vehicles are fairly heavy, and they require a lot of power for acceleration. Your motor shouldn't draw too much current, and it should have a high number of turns. If you want more power, try fewer turns, and use the speed control's torque limiter to check wheelspin and to extend battery life.



DIRT OVAL CARS



These cars fall between on-road and high-speed oval and are somewhat heavier than both because their suspension is more elaborate. They usually run on tracks with very high traction, and the ovals are rounder, so they cars get more speed in the turns. Two-wheel-drive dirt oval cars can run very hot, low-turn modified motors; 4WD cars usually require one extra turn because of the extra drag from driving all four wheels.

RIGHT MOTOR

ON-ROAD

On-road includes regular roadcourse and indoor carpet oval classes; both have high-speed straights and sharp turns. These tracks require strong acceleration and high top-end speed. Pan cars are very light and can use motors that have fewer turns. You'll need a motor that

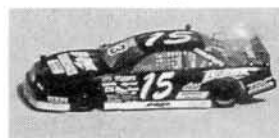


can balance low-speed torque (for acceleration) with high rpm. You also have to be mindful of the motor's power band.

A perfect motor would have smooth power from zero to maximum rpm. Unfortunately, most motors have a narrow range of speeds at which they produce a power peak. This powerband must be at the right speed for your car and track. When your motor hits its peak power, your car may suddenly accelerate. You should hit the peak power about halfway down the straights. If you hit the peak power toward the end of the straight, you'll overshoot the turn, and you certainly won't hit your top speed. You can measure the power band with a dyno, or by testing it while you drive.

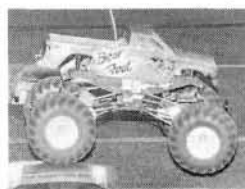
HIGH-SPEED BANKED OVAL

It's more important to choose the right motor in this class than in any other; you'll want a motor with high rpm. Because you don't slow down much in the turns, acceleration isn't important. Unfortunately, different tracks require different motors, and the competition is fierce, so you'll have to tweak your motor to its absolute maximum. Check out what your fellow racers use, and learn to tweak your motor. Of course, be mindful of your batteries, choose an aerodynamic body, etc.



DRAG RACE AND TRUCK PULL

These classes require incredibly powerful motors, such as low-turn or Astro Flight* motors. Run times are in the order of seconds, and you need huge battery packs. The



classes are sometimes determined by the motor types. If you expect your expensive motor to take the intense heat that these motors see, samarium cobalt magnets are almost a necessity.



GLOSSARY

Armature: the rotating core of a motor; holds the wound copper wire.

Brushes: brushes carry current to the motor windings by being in contact with the commutator as it spins. Standup brushes have their long edge parallel to the motor shaft; laydown motors have their long edge perpendicular to the shaft (as on stock motors).

Comm (commutator): the set of copper contacts on the end of the armature. Each contact is connected to one of the loops of wire that goes around the armature. The comm receives current through contact with the motor brushes.

Dyno (dynamometer): measures the speed and power of a motor.

Handout: a motor given to a racer just before a race. Handouts ensure that all racers have similar motors and discourage cheating.

Homework: back in the dark ages, school kids were given schoolwork—onerous, tedious and sometimes boring—to do at home. Doing my homework is how I learned to pick motors.

Modified: any motor that doesn't fit the definition of stock is considered "modified."

Outlaw stock motor: though really a modified motor, this is similar to a stock motor in that it has bushings and a fixed endbell and is permitted in some stock races. Its definition varies from track to track.

Spec (specified) class: a race class in which the only motors allowed are those specified by the race sponsor. This is usually done to keep costs low for the racer.

Stock motor: similar to the earliest R/C motors. ROAR defines a stock motor as one with 27 turns of 22AWG wire that is at least 64 inches long. ROAR allows no more than 24 degrees of timing; NORCA allows 30 degrees.

Timing: the angle of the brushes in relation to the magnets. Like timing in an internal-combustion engine, the faster the motor goes, the more advanced the timing has to be. On stock motors, timing is fixed, but it's adjustable on modified motors.

Turn: the number of times that a wire is wound around the armature. The more turns (winds), the thinner the wire has to be. Smaller wire has more resistance, so the motor draws fewer amps and has less power.

Wet magnets: made with a damp paste. They're dense, so they're strong. They are only actually wet while they're being manufactured.

Wind: refers to the number of turns and the kind of wire used on the armature. A motor can be wound with a single, large wire, or with several smaller wires wound together. When several wires are used, it's called a multiple wind, and the resulting armature is called a double, triple, quad or quint wind (depending on how many wires are used).

NARROWING YOUR CHOICES

Now that we've covered performance requirements, here are some further considerations.

■ **Wind (number of turns).** More turns means smoother response, less peaking (a broader power band) and longer run times. Fewer turns means higher rpm, but more battery strain. Cheap batteries may not last the full 4 minutes needed to finish a race. Multiple-wind armatures increase power. I think of these as fractional-turn motors; a 12-turn quad might be similar to an 11½-turn single (if you could make one). These are very useful for fine-tuning your setup.

and increasing efficiency and power. He can also wind a motor to give you less power if that is what you need for a particular application.

■ **Bearings and bushings.** Ball bearings allow motors to achieve higher rpm; they last longer and cost a little more than bushings. Stock motors use bushings. Thinner bushings run with less friction and can be broken in faster, but they wear out faster, too.

For stock motors, also consider the following:

■ **Standup or laydown brushes?** Laydown brushes are the hottest thing to happen to stock motors in a long time. They greatly increase power available from a stock motor

Which motor for what

Car	Turns										
	17	16	15	14	13	12	11	10	9	8	7
1/10 on-road—4 min.	—	—	—	—	×	×	×	×	—	—	—
1/10 oval—4 min.	—	—	×	×	×	×	×	×	—	—	—
1/12 on-road—8 min.; 6-cell	×	×	×	×	—	—	—	—	—	—	—
1/12 oval—5 min.; 6-cell	—	—	×	×	×	×	—	—	—	—	—
1/12 carpet—8 min.; 4-cell	—	—	×	×	×	×	×	—	—	—	—
1/10 off-road—4 min.; 6-cell	—	×	×	×	×	×	×	×	—	—	—
1/10 truck—4 min.; 7-cell	×	×	×	×	×	×	—	—	—	—	—
4WD dirt oval—4 min.; 7-cell	—	—	—	×	×	×	×	×	—	—	—
2WD dirt oval—4 min.; 7-cell	—	—	×	×	×	×	×	—	—	—	—
1/10 sprint car—4 min.; 7-cell	—	—	—	×	×	×	—	—	—	—	—
Drag racing	—	—	—	—	—	—	×	×	×	×	×
Truck pulling	—	—	—	—	—	×	×	×	×	×	—
Touring car	×	×	×	×	×	—	—	—	—	—	—
Formula 1	—	×	×	×	×	—	—	—	—	—	—

■ **Magnets.** Thicker magnets and denser wet magnets are stronger. Strong magnets make a motor more powerful at all rpm. They also make timing more critical to motor setup. Rare-earth (samarium cobalt) magnets sound really cool, but their high price is rarely justified. Because they only demagnetize in extremely high temperatures, they are often used in high-current-draw and truck-pull motors.

■ **Hand-wound or machine-wound.** Hand-wound motors cost more because they take longer to make. Their benefit is that the winder can pack the wires tightly into the armature, reducing rotating inertia

because they allow current to flow through the armature longer during each revolution. But they're inefficient because of timing overlap; they give you more power, but they use more power than standup brushes. Run time isn't usually a problem in stock motor racing, so this isn't a factor.

■ **Timing.** Higher timing gives you more top-end rpm, but you sacrifice low-speed torque. Highly timed motors are good for oval races in which speeds are nearly constant all the way around the track. Lower timing gives you more low-end torque for faster starts, but it may not provide better acceleration out of the corners (depending

on your speed). Lower timed motors are best for tracks that have very sharp turns and on which top-end speed is not very important. For recreational driving, lower timing also yields extended run time. Remember that ROAR stock motors are fixed at 24 degrees; NORRCA allows 30 degrees. (Modified motors have variable timing, so that isn't a factor in choosing a modified motor.)

■ **Armature type.** Several armature options can give your stock motor a performance boost. Split rotors and short-stack armatures reduce mass, thus increasing acceleration and maximum rpm. Armature heat sinks and cooling ducts are pluses, too. On modified motors, you can choose the number of turns and set the timing, so armature options are rarely necessary.

Choosing the perfect motor also depends on your skill. If you're an average driver, you should be satisfied with a wide variety of motors. As your skill improves, your definition of the perfect motor will narrow, and finding the perfect motor will become more difficult. If you're serious about choosing the best motor for a given track, call one of the major motor manufacturers and have your vehicle and track specs on hand; they have experts on staff who can help you.

WHAT'S THE NEXT STEP?

Not even all these considerations can guarantee that you'll find the perfect motor; no two motors are precisely alike because of manufacturing tolerances. But, often, you can improve a motor by tweaking it, breaking it in correctly and experimenting with different brushes and springs. On modified motors, you can also adjust the timing. (Then there's the matter of gearing....) Only change one thing at a time, and keep a detailed log of your progress. When you look back at your log, you'll be surprised at the subtle factors that have profoundly affected your racing.

There is no magical formula for choosing a motor, but following these tips will point you in the right direction. Now, get busy on your homework!

* Addresses are listed alphabetically in the Index of Manufacturers on page 181.

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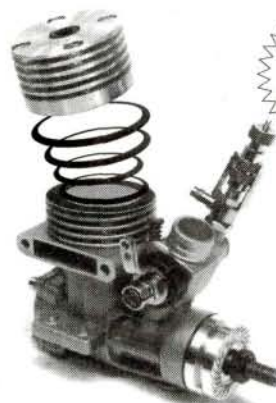


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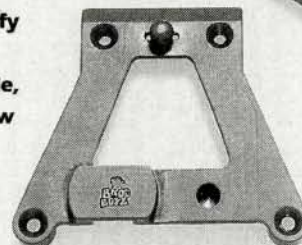
B2901 B2 Aluminum top front brace
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B2902 B2 Aluminum battery
strap Anodized—\$24

B2903 B2 Aluminum
tranny brace
Anodized—\$24



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TOP 5 TRACK LAYOUTS

Drafting for T-Shirts

IN THE January '96 issue of *Radio Control Car Action*, we announced a "Win a '95 IFMAR world championship T-shirt" contest. The rules were simple enough; all you had to do was design your own World Championship dream track and send us a copy of your draft. The five best track designers would each win an authentic IFMAR World Championship T-shirt that had been available only in Japan during the championships. We had each of the T-shirts autographed by '95 World champions Matt Francis and Mark Pavidis to further authenticate these collectable items.

We received an overwhelming response. By the last day of the contest, we had received hundreds of entries. It was difficult to choose just five winners because there were so many cool-looking track designs.

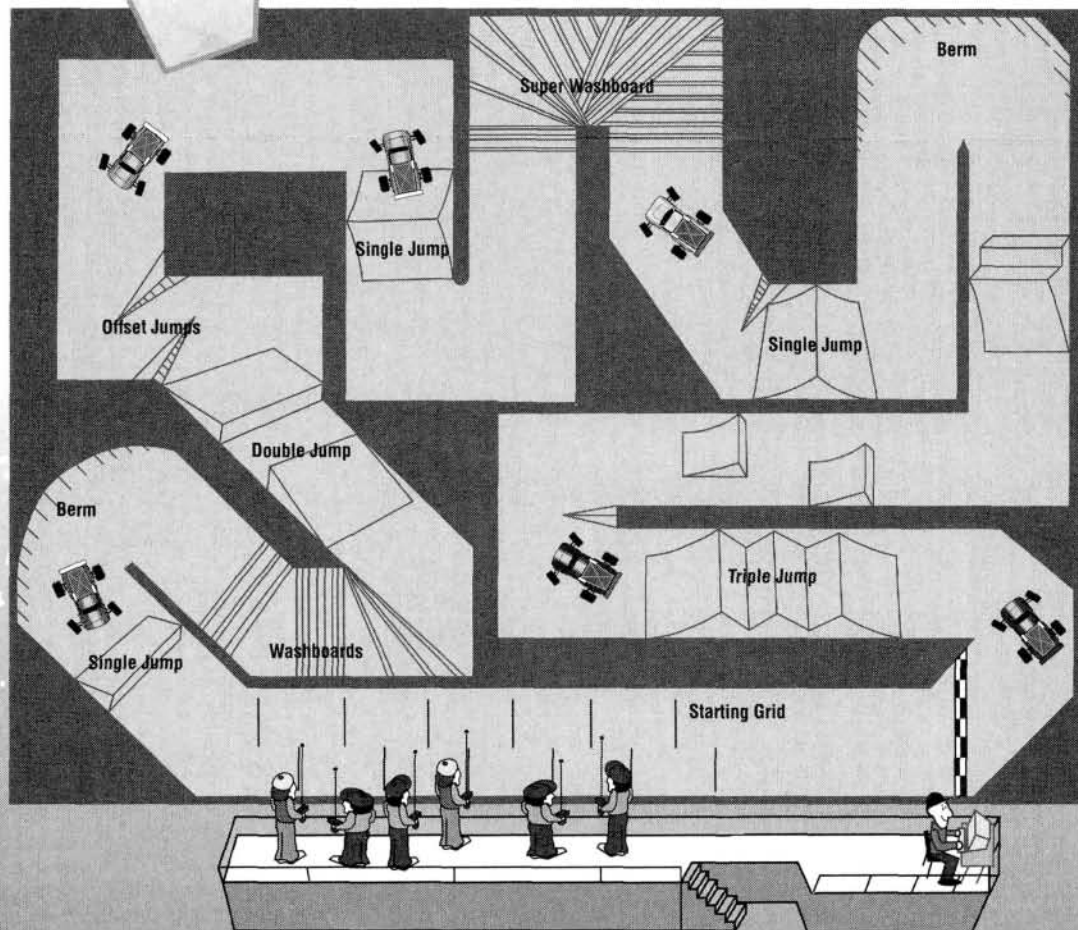
Of course, many entries seemed more suitable for demolition derbies than working track layouts. Some of these layouts featured obstacles such as tunnels, bridges, tar pits, hot coals, ice jumps, sand traps, land mines, razor-sharp pendulums and even heat-seeking missiles. We don't think you would find any of these at a world championship R/C racecourse, so even though we found these "death tracks" highly amusing, we were forced to eliminate them from the contest.

Editors Frank, John, and George were the judges and worked hard to select the five most challenging—and fun!—track layouts. Without further ado, here, in no particular order, are the winning designers and their layouts:



THE PRIZE:

Each of the 5 top track designers received an autographed IFMAR Worlds T-Shirt!



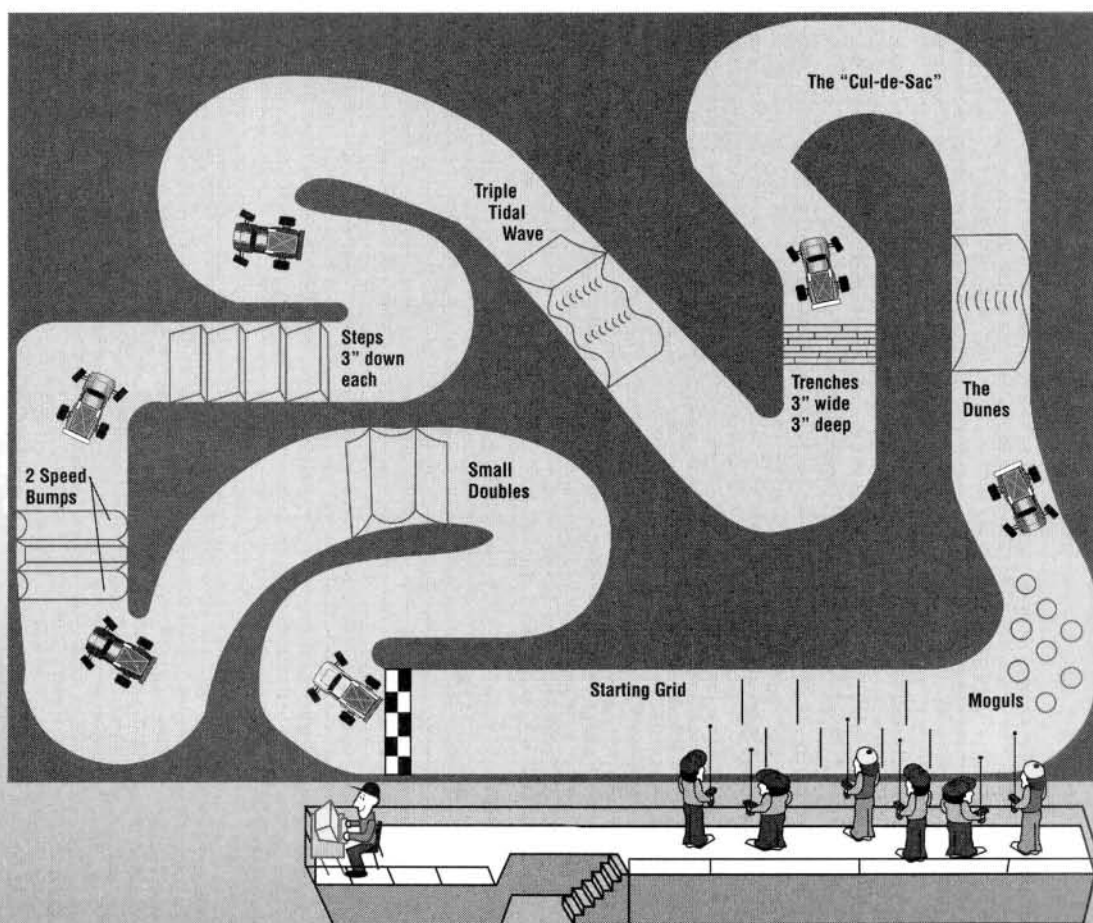
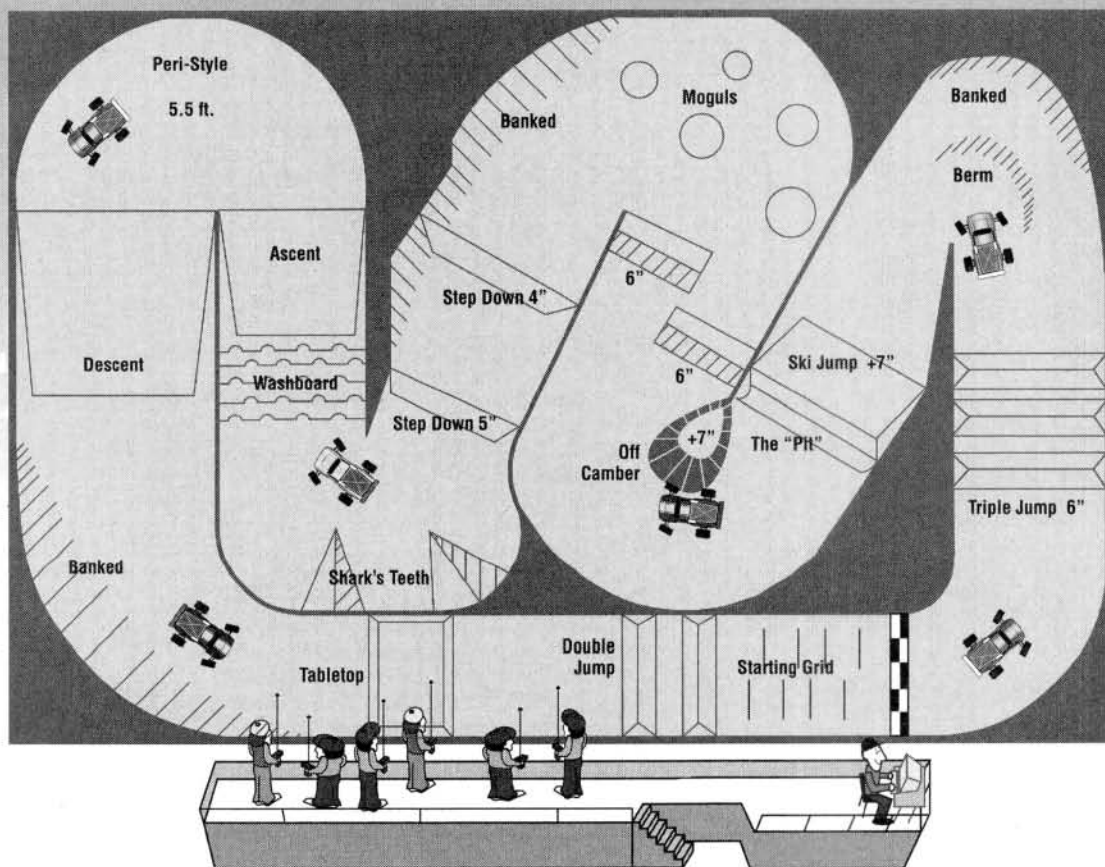
Track 1

Michael Carpenter

Homer, Louisiana

Track 2

**Greg
Tompkins**
**Fruitland,
Iowa**



Track 3

**Matt
Dutcher**

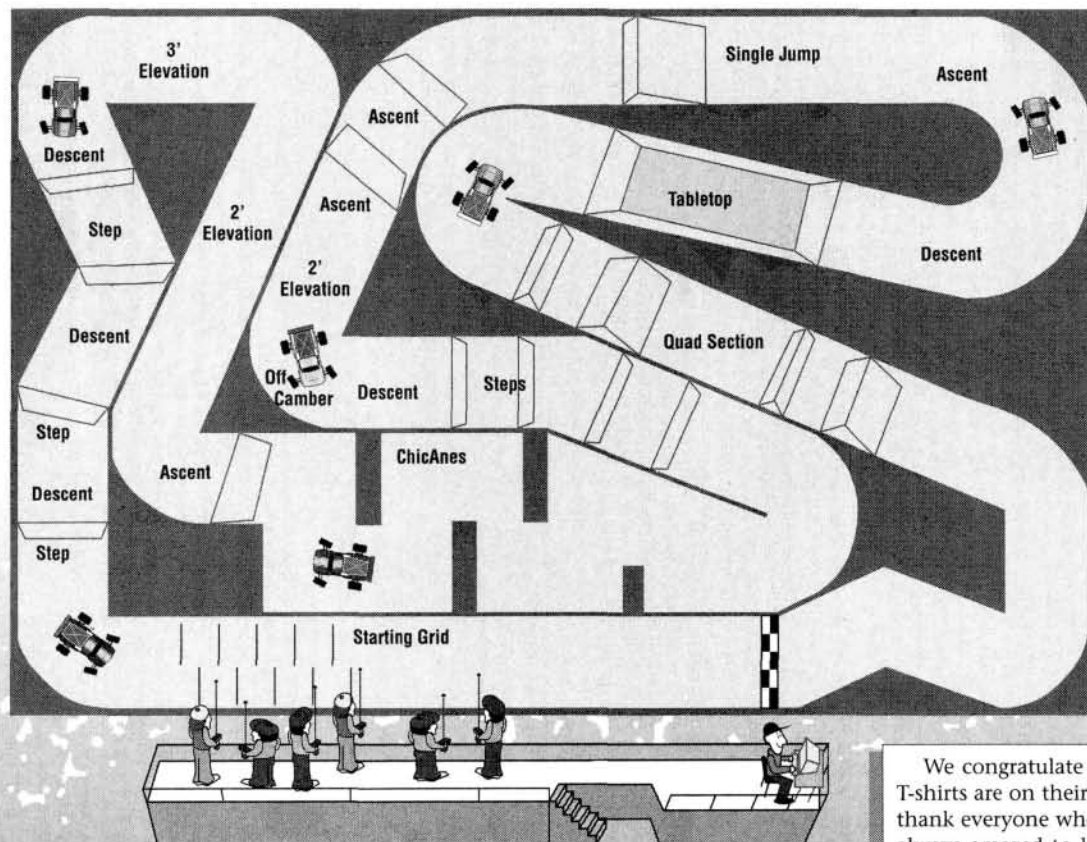
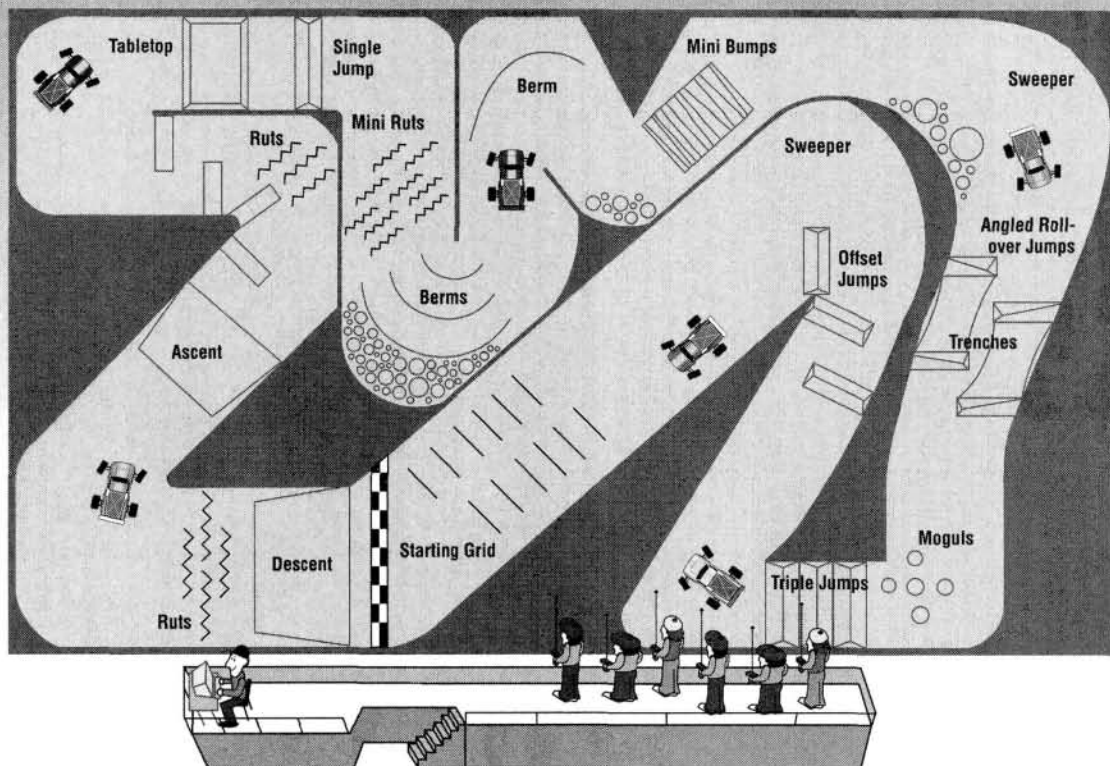
**Lawrence,
Kansas**

TOP 5 TRACK LAYOUTS

Track 4

Brandon Lamie

Kankanee, Illinois



Track 5

Ray Burns

Hutchinson, Kansas

We congratulate these great designers; their T-shirts are on their way. We would also like to thank everyone who entered the contest. We're always amazed to learn just how talented our loyal readers really are. We'll have other cool contests coming your way, so if you didn't win this time, who knows? Maybe you'll be the winner the next time around. ■



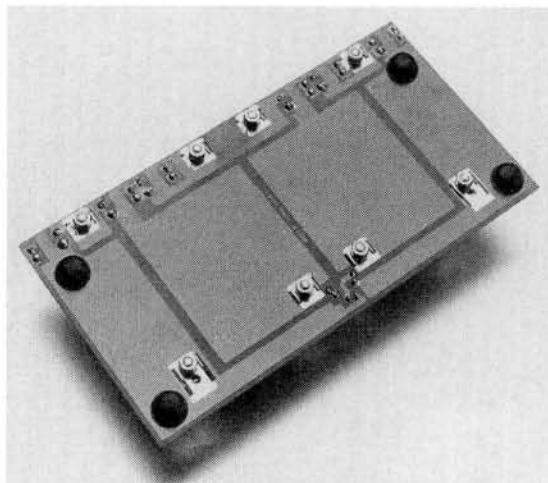
TEAM ORION

Active Discharge Device

by DEREK BUONO

CHARGERS HAVE come a long way, and taking proper care of your batteries has become a science. As chargers evolved, so did the art of discharging; keeping your batteries in peak condition has become a little easier. Team Orion*—a company better known for producing high-quality matched packs—has just released an Active Discharge Device that ensures maximum performance from your cells.

The design is incredibly simple and attractive. Six resistors and six diodes are coupled to discharge each cell independently down to a surprisingly low 0.5 volt. Most companies set their matchers to cut off at 0.90 volt per cell, so I called Peak Performance—the distributor of Team Orion products—to see why they chose 0.5. They explained that 0.5 volt brings the



PHOTOS BY WALTER SIDAS

The Team Orion Active Discharge Device features six resistors and diodes, which individually discharge every cell down to an amazingly low 0.5 volt.

Cell Voltage Test Results					
	Pack 1	Pack 2	Pack 3	Pack 4	Pack 5
Cell 1	0.51	0.47	0.50	0.46	0.50
Cell 2	0.51	0.47	0.49	0.47	0.50
Cell 3	0.50	0.47	0.50	0.46	0.51
Cell 4	0.51	0.48	0.50	0.46	0.51
Cell 5	0.51	0.48	0.49	0.46	0.51
Cell 6	0.50	0.47	0.49	0.47	
Average cutoff voltage = 0.489 volt					

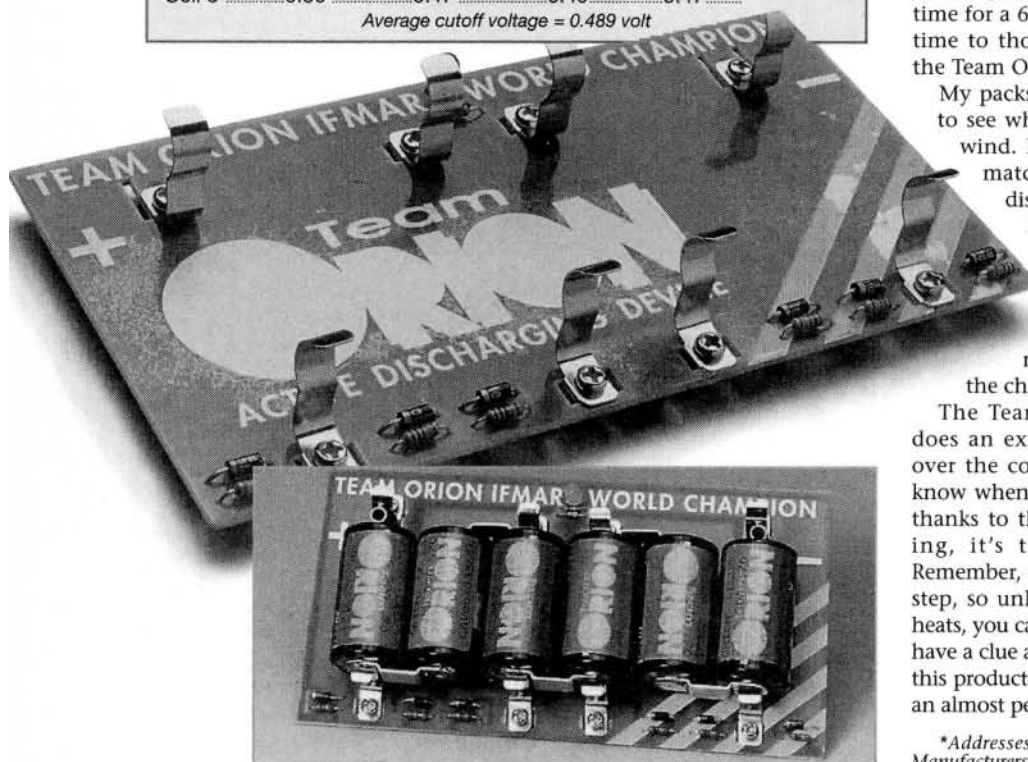
cells to their "best starting point to begin charging." They also stressed that this is the *final* discharge step; don't attempt to discharge partially or fully charged packs with this unit! The discharger also features an LED light that tells you when the pack has been completely discharged. I found that the average discharge time for a 6-cell pack is 18 hours; it takes a long time to thoroughly discharge your pack using the Team Orion device.

My packs are a little old, so I tried them out to see whether they could be given a second wind. I took five of my 6-cell SCRC 1700 matched packs and let the Team Orion discharger do its thing. Initially, I was surprised at how long it took to reach the claimed 0.5V cutoff, but the data show that it does what it says (with some minor variation).

I checked each cell's voltage with my trusty digital voltmeter (refer to the chart).

The Team Orion Active Discharge Device does an excellent job and gives you an edge over the competition. Unlike other trays, you know when the pack has been fully discharged, thanks to the handy LED; when it stops glowing, it's time to get the charger going. Remember, this is the absolute final discharging step, so unless you have a lot of time between heats, you can keep this tool at home. If you don't have a clue about how to take care of your Ni-Cds, this product might give you an edge by providing an almost perfect discharge match every time.

*Addresses are listed alphabetically in the Index of Manufacturers on page 181.



by JOHN HOWELL

YEAR AFTER YEAR, the Team Losi* Florida Winter Champs is recognized as one of the premier off-road R/C races in the United States. It attracts drivers from

all over the country and the world; this year, the first 441 racers were accepted from 1,500 applicants. I was psyched to go, because I knew I was going to see some of the best racing action in the world! (OK; the awesome weather was an added bonus.)

I arrived late Thursday night, checked into my hotel, and met up



Team Losi's JR Mitch catches some late-day rays toward the end of qualifying.



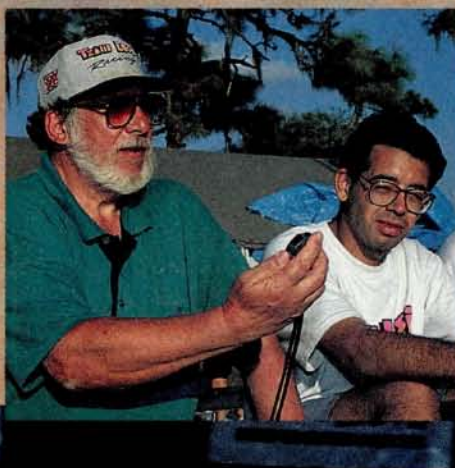
Every morning, we were greeted by intense fog. By late morning, it burned off, and we enjoyed some awesome, 80-degree sunny weather.

his teammate Kevin Moore. They quickly filled me in on who was running fast, what the track conditions were like, what the hot setups were and which level of sunblock they recommended! After catching up with these guys, I hit the sack and set my alarm for 8 a.m., so I could catch all the qualifying rounds early the next morning.

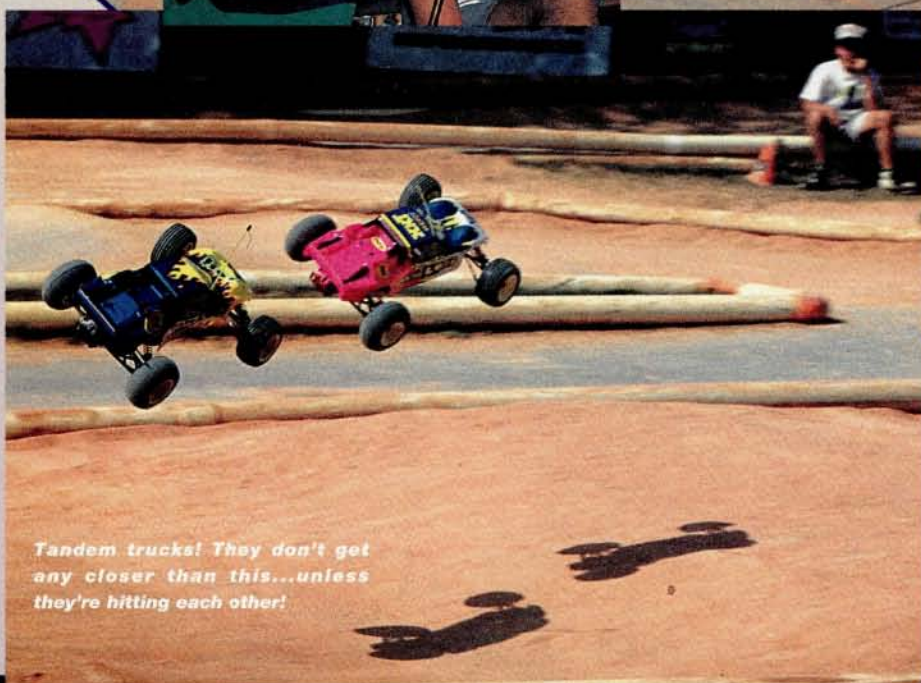
QUALIFYING

When I arrived at the track, I was a little taken aback. At top races, the track surface is usually so well-groomed, that you could race a pan car on it. What I saw was quite the opposite: there were holes and ruts all over. As I walked through the pits, I found out that many racers were disappointed with the track.

with Team Losi's Jack Johnson, Richard Trujillo and Scott Brown, as well as England's Model Cars editor Alan Harman and



Pops Losi and Team Manager Richard Trujillo catch lap times on Brian Kinwald's 2WD buggy.

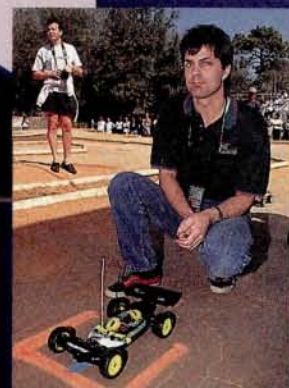


Tandem trucks! They don't get any closer than this...unless they're hitting each other!

Florida Winter

in Tampa

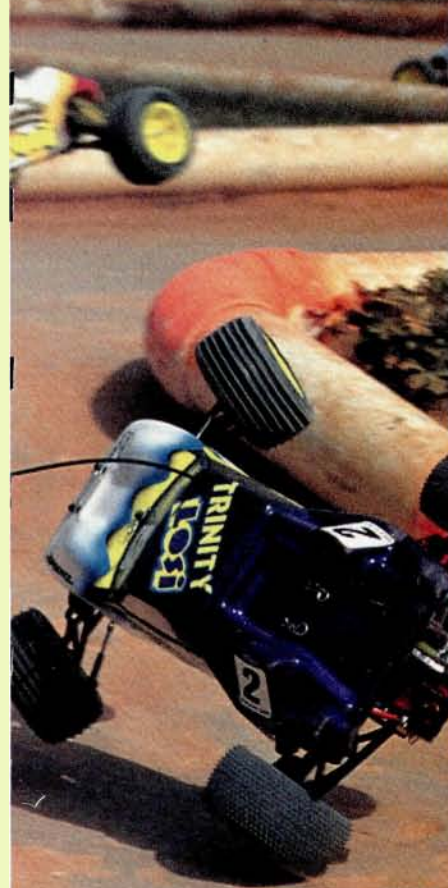
Richard Weatherly of Tenth Technology stands beside Brian



Kinwald's Predator 4WD car. This was the first race at which Brian used this unique buggy from the U.K.



Team Trinity/Team Losi drivers Greg Hodapp, Brian Kinwald and Team Losi's Jack Johnson sit on the sidelines and check out the last of Saturday's qualifying rounds.



PHOTOS BY JOHN HOWELL



Matt Lee goes for major air over the doubles with his Double-X.

Mark Pavidis tries to get his Yokomo (#2) past Kinwald's Predator on the outside of the first turn.



conditions. Throughout qualifying on Friday and Saturday, the track was inconsistent: it was slower and then faster as the sun dried out the wet, foggy morning conditions. It also "chunked up" more and more as the weekend progressed, and it wouldn't hold a consistent blue-groove.

Some spots were so rough, that a rumor started going around they had to fill in the major holes with a mixture of mortar and clay!

I talked to a few of the racers and was told that the track had been in awesome shape only a few days earlier, but now it was hard to nail the right setup, because racers were busy "chasing the track conditions" instead of dialing in their cars to one type of track. I knew qualifying was going to be interesting!

Overall, all the racers had to endure the same track conditions. It couldn't be perfect for every round, but after observing all the rounds, I think everyone had a fair shot. Let's see who did what.

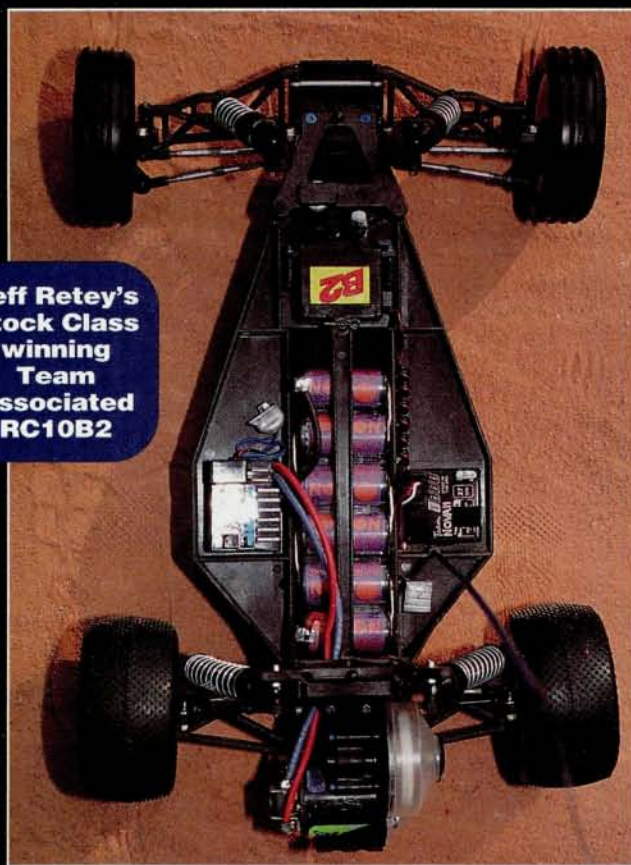
ter Champs

SPONSORED BY TEAM LOSI & R/C CAR ACTION

JULY 1996 97

WINTER CHAMPS WINNING CARS

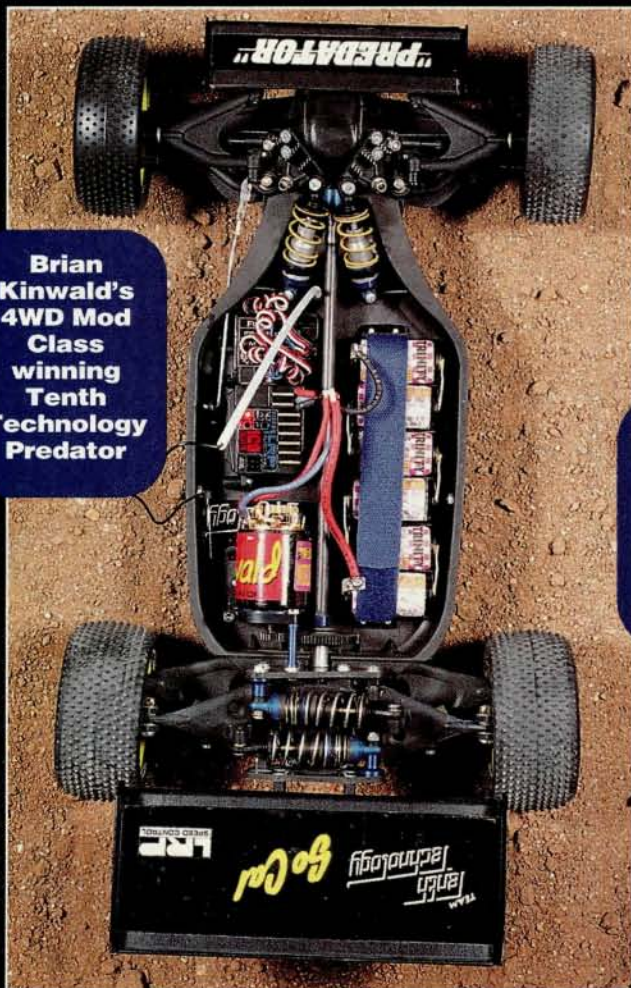
**Jeff Retez's
Stock Class
winning
Team
Associated
RC10B2**



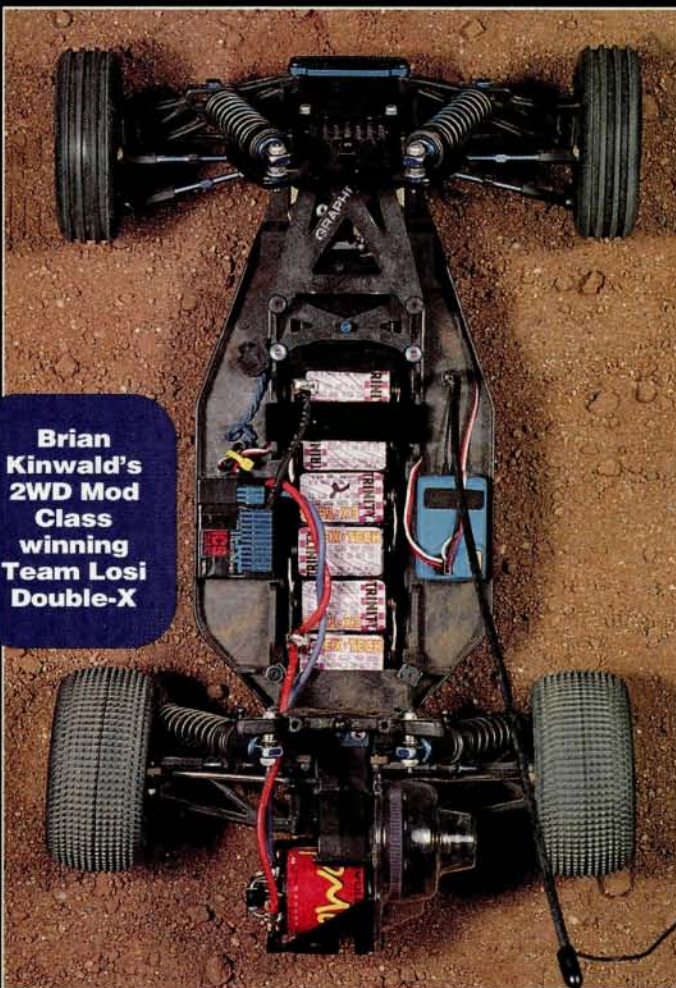
**Greg
Hodapp's
Mod Truck
Class
winning
Team Losi
Double-XT**



**Brian
Kinwald's
4WD Mod
Class
winning
Tenth
Technology
Predator**



**Brian
Kinwald's
2WD Mod
Class
winning
Team Losi
Double-X**





Winter Champs Winners

2WD Stock											
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	3	Jeff Retez	Assoc.	Handout	Orion/Reedy	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	25/78
2	8	Craig Chin	Losi	Handout	Trinity	Tekin	Airtronics	Jammin	Losi	Trinity	25/84
3	4	Chris Bing	Assoc.	Handout	Scouters	Tekin	JR	Assoc.	Losi/Pro-Line	Assoc.	26/84
4	10	Nick Lasley	Losi	Handout	Trinity	Tekin	Airtronics	Jammin	Losi/Losi	n/a	22/86
5	9	Edward Corsini	Losi	Handout	New Wave	Tekin	Airtronics	Jammin	Losi/Losi	n/a	27/84
6	2	Todd Hodge	Losi	Handout	Trinity	Tekin	Airtronics	Jammin	Losi/Losi	n/a	26/84
7	5	Eric Pesto	Losi	Handout	Orion	Tekin	JR	Jammin	Losi/Losi	none	23/84
8	6	Jordan Musser	Assoc.	Handout	Genzo	Tekin	KO Propo.	Assoc.	Losi/Pro-Line	n/a	23/78
9	1	Randy Konruff	Assoc.	Handout	Orion	Tekin	JR	Assoc.	Losi/Pro-Line	n/a	25/81
10	7	Allen Horne	Assoc.	Handout	Perfect Match	Tekin	Airtronics	Assoc.	Losi/Pro-Line	none	27/78
2WD Mod											
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Brian Kinwald	Losi	Trinity	Trinity	LRP	Airtronics	Jammin	Losi/Losi	Trinity	20/84
2	2	Alex Guerrero	Losi	Peak Perf.	Orion	Novak	Airtronics	Jammin	Losi/Losi	Jack's*	n/a
3	5	Greg Hodapp	Losi	Trinity	Trinity	Tekin	Airtronics	Jammin	Losi/Losi	Trinity	20/84
4	8	J.D. Beckwith	Assoc.	Reedy	Reedy/Orion	Novak	Airtronics	Assoc.	Losi/Pro-Line	n/a	19/81
5	4	Mark Pavidis	Assoc.	Reedy	Reedy/Orion	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	19/81
6	7	Jason Ruona	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	19/81
7	10	Rick Vehlou	Losi	Peak Perf.	Orion	Novak	Airtronics	Jammin	Losi/Losi	none	18/84
8	3	Sohrab Tavakoli	Losi	Peak Perf.	Orion	Novak	Airtronics	Jammin	Losi/Losi	n/a	18/84
9	9	Brian Dunbar	Losi	Trinity	Trinity	Novak	JR	Jammin	Losi/Losi	n/a	21/84
10	6	J.R. Mitch	Losi	Maxtec	Stealth	Novak	Airtronics	Losi	Losi/Losi	Jack's	20/84
4WD Mod											
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Brian Kinwald	10th Tech.	Trinity	Trinity	LRP	Airtronics	10th Tech.	Losi/Losi	Trinity	n/a
2	2	Mark Pavidis	Yokomo	Reedy	Reedy	LRP	Airtronics	Yokomo	Pro-Line/Pro-Line	Assoc.	n/a
3	3	Derek Furutani	10th Tech.	Maxtec	Maxtec	Tekin	KO Propo.	10th Tech.	Losi/Losi	none	19/70
4	4	J.R. Mitch	Schumacher	Maxtec	Stealth	Novak	Airtronics	Schumacher	Losi/Losi	none	16/89
5	10	Brad Reelfs	Schumacher	Peak Perf.	Orion	Novak	Airtronics	Schumacher	Pro-Line/Pro-Line	Assoc.	16/92
6	8	Bret Reelfs	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line/Pro-Line	Assoc.	17/87
7	5	Jurgen Lautenbach	Yokomo	LRP	LRP	LRP	KO Propo.	Yokomo	Pro-Line/Pro-Line	Assoc.	18/87
8	9	Ralf Skatulla	Yokomo	LRP	LRP	LRP	KO Propo.	Yokomo	Pro-Line/Pro-Line	Assoc.	18/87
9	7	Jimmy Jacobson	Yokomo	Reedy	Reedy	LRP	Airtronics	Yokomo	Pro-Line/Pro-Line	Assoc.	18/87
10	6	Jimmy Babcock	Yokomo	Maxtec	Maxtec	Novak	Airtronics	Yokomo	Losi/Losi	n/a	17/87
Truck Mod											
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	2	Greg Hodapp	Losi	Trinity	Trinity	Tekin	Airtronics	Jammin	Losi/Losi	Trinity	19/88
2	1	Sohrab Tavakoli	Losi	Peak Perf.	Orion	Novak	Airtronics	Losi	Losi/Losi	Jack's	18/88
3	3	Brian Kinwald	Losi	Trinity	Trinity	LRP	Airtronics	Losi	Losi/Losi	Trinity	19/88
4	6	Scott Brown	Losi	Trinity	Trinity	Novak	JR	Jammin	Losi/Losi	Trinity	29/88
5	9	Rick Hohwart	Assoc.	Peak Perf.	Orion	Novak	Futaba	Assoc.	Pro-Line/Pro-Line	Assoc.	19/87
6	5	Matt Ledger	Assoc.	Reedy	Orion/Reedy	LRP	JR	Assoc.	Pro-Line/Pro-Line	Assoc.	n/a
7	10	J.D. Beckwith	Assoc.	Reedy	Reedy/Orion	Novak	Airtronics	Assoc.	Pro-Line/Pro-Line	n/a	18/87
8	4	Mark Pavidis	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	n/a
9	8	Chris White	Assoc.	Reedy	Reedy	Novak	JR	Assoc.	Pro-Line/Pro-Line	Assoc.	19/87
10	7	Scott Hughes	Assoc.	Reedy	Reedy	LRP	Futaba	Assoc.	Pro-Line/Pro-Line	n/a	18/87

*Jack's Secret Sauce

• **2WD Stock.** This has always been a popular "proving-grounds" class. Drivers who do exceptionally well here do not go unnoticed; they are quickly recognized by the factory teams. Randy Kondruff piloting Team Associated's* new B2 turned nine laps in 4:20.94 to take the pole position. Following Randy was Todd Hodge with his Losi Double-X with a nine-lap 4:24.81, while Jeff Retez and his Associated B2 captured third place in qualifying with a nine-lap 4:24.90 run.

• **2WD Modified.** The big guns race here!

Yes, this class lays claim to all the bragging rights. Hot off sweeping the 2WD title at the Reedy Race of Champions, Team Trinity*/Team Losi's Brian Kinwald once again showed everyone in Florida that he was the man to beat with his nine-lap 4:05.95. The runner-up position went



Peak Performance owner Rick Hohwart shows Greg Dennett the proper technique to properly balance tires.

to Team Losi driver Alex Guerrero with a nine-lap 4:08.96, and third place went to Team Losi's Sohrab Tavakoli with a nine-lap 4:09.05.

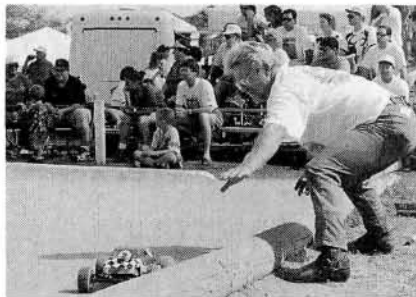
• **Truck Modified.** The Truck TQ bounced around, but when the dust settled, it was Sohrab Tavakoli's Double-XT that claimed the first spot on the

FLORIDA WINTER CHAMPS

starting grid. His nine-lap 4:07.48 run was followed by Team Trinity/Team Losi driver Greg Hodapp's run of nine laps in 4:07.84, and Brian Kinwald followed his teammates' Double-XTs with a nine-lap 4:09.99 run.

• **4WD Modified.** Piloting his brand-new Tenth Technology* Predator off-road buggy, Brian Kinwald took the top honors with a nine-lap 4:02.73 run. Hot on his tail was Team Associated driver and current IFMAR 4WD Off-Road World Champ Mark Pavidis with his Yokomo* 4-wheel. Mark's nine-lap 4:03.87 was good enough to put him ahead of Derek Furutani's Predator, which turned nine laps in 4:05.99.

With qualifying behind us, it was time to head back to our hotel rooms and wrench on cars (if we had done well), or enjoy



"Turn Marshall of the Year": Dick Gillette—the man handling the first turn at the end of the straightaway; if you got hung up, you were back on track in the blink of an eye.

the Florida...well...let's call it "nightlife" (if we didn't do so well).

A-MAIN ACTION

The Modified A-Mains were run in the three-leg format with the worst race

tossed out. The only Main that didn't adhere to this rule was the stock class: you had only one shot at glory, so you had to make it count!

• **2WD Stock.** This was the first of the Mains to go. TQ Randy Kondruff jumped out to an early lead, followed by Todd Hodge and Jeff Retej. Shortly into the race, leader Hodge bobbled in the sweeper, and Retej jumped into the lead. Number four qualifier Chris Bing and eighth qualifier Craig Chin started to move up to the front of the pack, while Retej started working on a considerable lead.

At the 2-minute mark, Craig Chin blew by everyone to take command of second place; it would take some work to close the gap between him and Retej though. As the race started to wind down, it was fairly obvious that if Retej could keep it on all fours and keep from dumping, he'd

NEW IN THE PITS

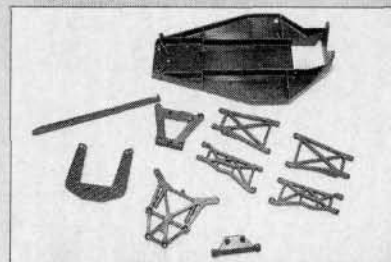
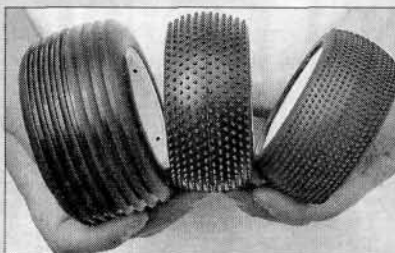
the tires in the opposite direction, and you'll you get more steering.

• **Angled, ribbed front truck tires** (left). Available in Silver and Gold compounds, these new, front Wedge truck tires offer smoother steering response than Losi's directional ribbed tires. The Wedge (no. A-7506S—Silver; A-7506G—Gold) will retail for \$17.95.

• **Round Carcass IFMAR Pins** (center). Also new are these Round Carcass IFMAR Pins. These experimental tires are a little larger and have a rounder carcass than standard IFMAR Pins. They work a little better on rougher tracks and are better over bumps. They also seem to hook up better and give you more traction on wet/slimy track conditions.

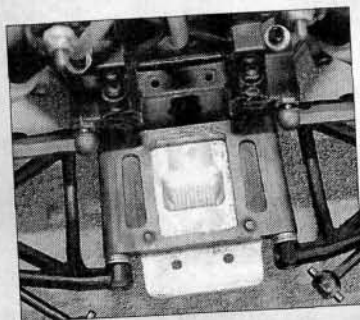
TEAM LOSI

• **Sprint Patterns** (right). Molded out of the popular Silver compound, these new buggy tires were the hot ticket at the 'Champs. According to sources at Losi, the tires were named "Sprint Patterns" because in tread design, they resemble full-size sprint-car tires. They're very versatile: run the tread with the outer directional blocks pointing toward the front of the buggy, and you'll get more side-bite/traction; run



TEAM ASSOCIATED

• **Carbon-fiber B2 pieces.** These trick carbon-fiber pieces are now available for the B2. Curtis Husting of Team Associated showed me samples of the new pieces, and let me tell you, they look good. Here's what's available: standard length chassis—no. 9199; a short chassis—9202; a battery hold-down strap—9229; a transmission brace—9381; front arms—9106; rear arms—9256; front top plate—9131; front shock tower (graphite)—9141; and a rear molded shock tower—9271.

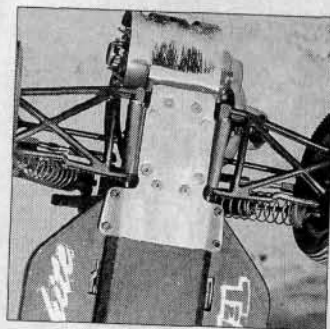


• **New 3-degree-toe-in rear end.** By far, the hottest item in the Losi pits was this new rear end for the Losi Double-X and Double-XT. It had everyone doing "double takes" (pardon the pun).

The biggest change is in the rear pivot support. The original pivot support was a one-piece unit, which featured 0-degree toe-in. The new rear end will have a one-piece pivot plate and separate pivot supports, which can be changed independently from the plate. The new pivot supports will have 3 degrees of toe-in and will be available with 2 and 4 degrees of anti-squat just as the old one-piece was. The hubs will now have 0-degree toe-in. According to



Losi, this product took more than a year of testing to optimize and perfect the proper geometry of arm/pivot support/hub placement. So, what do you gain from this new rear end? How would you like your truck or buggy to have more consistent handling and more rear traction, without losing any steering? Yeah, I thought so! The new rear-end kit should be available by the time you read this, and it will come with the pivot plate, pivot support, two suspension arms (with the newest additional outer hole), two hubs and all the miscellaneous assembly hardware you'll need to complete the kit.

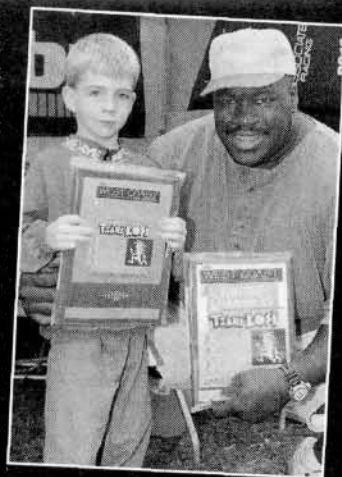


be the champ. Chin, still in second, had number four, Bing, hot on his bumper. Coming through the sweeper, Chin got hung up on the pipe, and Bing ducked under him and went past into second. With only 5 seconds left on the clock, Chin put the hammer down and motored past Bing to steal second back! Talk about a close finish!

Revey crossed the line in first place with eight laps in 4:01.7, and Chin took second with eight laps in 4:03.69. Bing secured third overall with eight laps in

In the J-Main, there was a fierce battle between two racing giants. It was orchestrated from the drivers' stand between the largest giant at the track—the San Diego Chargers' Reuben Davis—and the littlest giant—Trey Scott. At the 4-minute mark, Reuben crossed the finish line first with Trey close behind in second. Little Trey was so upset at his loss to the San Diego big man, that he jumped up on the railing of the drivers' stand and, while Reuben was being congratulated by another competitor, leapt forward with his forearm extended and clotheslined Reuben to the ground while pummeling him with his radio! OK, OK, so maybe that's not a completely accurate reenactment. Actually, Trey took his second-place finish in stride, and even temporarily shelved his fierce competitive nature to pose with Reuben for this picture. But as soon as the camera was tucked safely away and I headed off to the pits, I swear I overheard a tiny voice say, "You just wait till next year, pansy" I could be wrong, though....

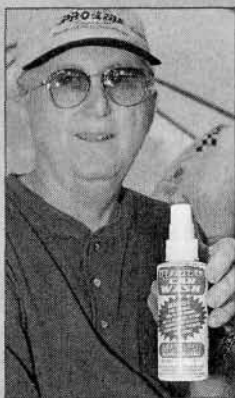
DAVID AND GOLIATH



4:04.82. Nick Lasley and Edward Corsini rounded out the top five. Nick turned eight laps in 4:06.74, and Edward turned in eight laps in 4:10.18.

The modified Mains consisted of three

races that determined the overall winner; I'll give you the highlights of each class instead of going into each of the nine races, blow by blow.



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Tired of looking at that dirty old car? Why don't you clean it up a bit with Mike Reedy's new R/C Car Wash Cleaner (no. 711). This new body spray is safe on all

Lexan bodies and helps add that concours sparkle. It has also been found to help add a little extra shine to your tennis sneakers—crazy, isn't it?

MIP

• Polished CVDs and lightweight aluminum outriggers for the Associated B2 & T2 and Losi Double-X & Double-XT. These are so new, that part numbers and prices



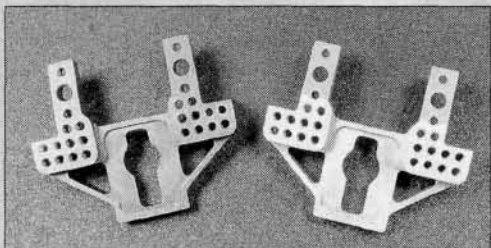
aren't yet available as I write this. The polished CVD's offer no additional performance gains over standard

CVD's, but man, do they look trick! The lightweight outriggers for the Losi and Associated cars and trucks help to reduce rotating mass, which, in turn, helps your car or truck accelerate faster. For more info, contact MIP.

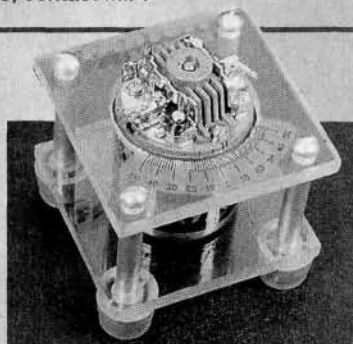
FANTOM RACING

• Aluminum rear bulkheads

for Team Losi's Double-X and Double-XT. The direct replacement rear bulkhead (no. F348) is only 8.6 grams heavier than the stock unit and is available in blue, purple, or natural aluminum finish; retail—\$35. New bulkheads will also be



available with Losi's trick new camber link holes. Also available from Fantom is an aluminum tranny brace (F349), which is also available in blue, purple and natural aluminum finish; retail—\$7.50.



• Motor Timing Fixture.

This neat tool (no. F630) allows you to set your timing on any modified motor; four pins at the base of the unit align the motor properly so the can is at 0 degree; the gauge at the top of the tool is in 2-degree increments. It's also handy as a motor holder for soldering on brushes, capacitors, etc.; retail—\$29.95.

• 2WD Modified. All I can say about this class is that top-qualifier Brian Kinwald is the man—no doubt about it! Brian placed first in two of the three Mains (the first and the third) to take the overall victory; his throwout round was a still-impressive second-place finish. Alex Guerrero wowed everyone with his first-place finish in the second Main and his second-place finish in the third Main. With his awesome driving, Alex netted second place overall. Greg Hodapp's second- and third-place finishes secured third place overall, and Team Associated's J.D. Beckwith finished fourth overall with third and fourth finishes. Associated driver Mark Pavidis wrapped up the top five with third and seventh finishes.

In my opinion, the most impressive race of the whole event was the third and final leg of this class. J.D. Beckwith put in his best run and battled with Kinwald for the lead. They were neck and neck for what seemed like hours. As the battle ensued, spectators were on the edge of their seats in the stands, and the trackside bystanders "oohed" and "aahed" at every attempted pass. Finally, toward the very end of the race, J.D. got hung up, and Alex Guerrero snuck underneath to take second. It was an awesome finish and way too cool for words!

• 4WD Modified. Once again, "the man" Brian Kinwald stole the show. Not only did Brian TQ the class, but he also dominated by winning the first and second Mains to take the overall win; as a matter of fact, Brian was the only racer to pull off a 10-lapper in any of the Mains, which was quite an accomplishment considering the track con-

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FLORIDA WINTER CHAMPS

ditions. Add to that the fact that this was the first race in which Brian used a brand-new Predator, and it's even more impressive. Brian decided to sit out the final race so the other racers could battle it out for second.

Other impressive finishes were put in by Team Associated's Mark Pavidis with his silly-fast, 7-cell, 9-turn Yokomo, as well as by Derek Furutani with his Predator. Pavidis went on to take second overall with a first and a second, and Furutani finished third overall with a second and a third. JR Mitch and Brad Reelfs took fourth and fifth, respectively, with their Schumachers.



Before the 2WD A-Mains, Alex Guerrero "bench-races" with his teammate Brian Kinwald. Guerrero finished second overall behind Kinwald—his best showing to date at a major off-road race. Watch for Alex to be a force to reckon with at upcoming off-road races.

• **Truck Modified.** OK; this time it wasn't the Kinwald show; the spotlight was centered on his teammate Greg Hodapp. Greg was absolutely on fire in this class, and he put in two first-place finishes to take the win. During one of the Mains, Hodapp grabbed a great start and was punted out of the way in the first turn. Greg had to battle back to the front past almost everyone. His charge back to the front was an impressive showing of his awesome driving skill.

Top-qualifier Sohrab Tavokoli put in a first- and a second-place finish to take second overall, while Brian Kinwald grabbed two second-place finishes to place in the top three. Team Losi's Scott Brown parlayed his two fourth-place finishes into fourth overall, and with his RC10T2, Peak Performance's* Rick Howhart took his third- and fifth-place finishes to fifth overall.

When all was said and done and the dust had settled, there were two entirely different camps—an overjoyed Losi pit area and a not-so-overjoyed Associated pit area. But, racing is racing, and the day belonged to the Losi and Trinity crews. Their cars were hooked up, their drivers were on top of their game, and they thoroughly tested a lot of setups that helped them in the end. Congratulations to Brian Kinwald and Greg Hodapp and, of course, to Jeff Retej for his stock class win.

**Addresses are listed alphabetically in the Index of Manufacturers on page 181.*

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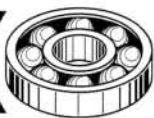


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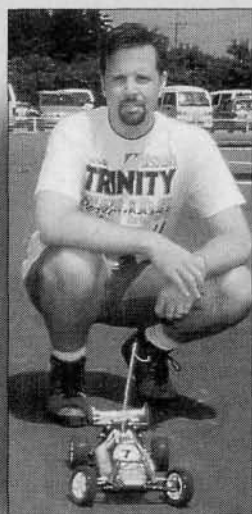

Florida Winter Cha

What happens when people such as Kinwald, Hodapp, Pavidis and Tavakoli show up at a race? Do they just arrive and hit the track? Are they instantly dialed in? You'd be surprised. There's a major misconception that the factory racers get to the track the day before the race, practice for a few hours and are completely hooked up. That's not quite the case. Many racers show up at least a week before the race, so they can practice and test different setups every day. To give you a little insight into what goes on at a race, here are two perspectives on what happens from the day the teams arrive, to the day of the Mains. I spoke with team manager Jack Johnson of Team Losi and Team Associated's number-one test driver Mark Pavidis to see what their testing routine consists of. Here's how they handle hooking up at the track.

How the Pros Get Dialed In

by JOHN HOWELL

JACK JOHNSON—TEAM LOSI



FRIDAY.

"Kinwald, Hodapp, Tavakoli and I arrived in Florida early (Friday night) so we had six days of testing before the race."

SATURDAY.

"This is the first day that we had on the track. We basically just learned the track layout. We also

wanted to see if we could fine-tune our existing setups to see if they worked. Brian brought three cars with different setups to see what he liked. Actually, all the buggies were pretty hooked-up from the beginning. We did have to alter our damping, because when we first got there, the temperature was hovering around 40 degrees."

SUNDAY. "It started to warm up again, so we messed around a bit with damping to get hooked-up better. We were basically still trying to fine-tune our setups. There was a club race going on, and we wanted to use this as a benchmark to see how we compared with our competition. We didn't make a lot of changes to our buggies. This was also the first day that we ran our trucks; they were way out in left field and a long way from perfect. I took the front and rear suspension off my truck and put it on Sohrab's. That way, he could quickly switch back and forth

between my setup and his. After testing with my suspension, he took my stuff off and changed over to my setup and subtly refined it. Greg and Brian worked on their own setups. We've found that they're most productive working as a team, and they get dialed in quicker doing it that way. I wanted to work with Sohrab to get him up to speed."

MONDAY. "They let the track go, and it started to blue-groove. Our new tires arrived (the new Sprint Patterns and Round Carcass IFMAR Pins), and we did some testing with them. We found the Sprints to be more consistent, so we stuck with them. The blue-groove started to really affect handling, so we started testing with adding weight underneath the front bulkhead to alter the vehicles' weight distribution. Team guys were putting either 1/4 or 1/2 ounce of weight to decrease initial turn-in. Adding the weight did take away from initial turn-in, but it increased steering throughout the entire turn. When a track blue-grooves, you always have more of a problem with initial turn-in. Some of our guys liked it with the weight; some didn't. The rest of the team showed up late Monday night, and Gil Jr. brought along some new rear ends for the cars and trucks, which were handed out on Tuesday."

TUESDAY. "We went through what we learned about tires and setups with the rest of the team first thing in the morning, and then we passed out the new rear ends. Everyone who put them on the truck was really happy with them. But because this was the first time using this part, some liked

it on the buggy; some didn't. The ones who didn't like it, took it off owing to lack of time to dial it in.

"Hodapp ran his trucks for the first time on Tuesday, and was running roughly the same setup as Brian, but Brian appeared to be struggling with his a little more than Hodapp. Scott Brown didn't change anything on his truck at all. He just went out with his setup and drove like crazy. The track was changing so much that he didn't want to change a lot; he wanted to get used to driving it."

WEDNESDAY. "We started messing around with front swaybars for the buggy. There was a lot of potential there, but we didn't really have the time to dial it in properly, so we took them off. We started altering the chassis length on our trucks by 1/4 inch. Trucks tend to get a little evil on high-bite, blue-grooved tracks. There's so much traction because the tires are so big, and there's a large contact patch between the tire and the track surface. When we lengthened the chassis, it really smoothed out the truck's handling. It was less reactive with the longer wheelbase. After testing that chassis, we're going to release a production chassis like it."

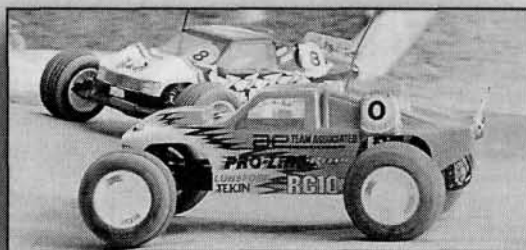
THURSDAY—CONTROLLED PRACTICE.

"You got only two runs per class, so everyone went out with somewhat of a 'race setup.' After the first run, everyone had one complete round on the track with both buggy and truck. I had been keeping track of lap times for everyone, and I saw a few of our drivers were off the pace a little bit. I sent them over to a driver who had a similar driving style to see how they had their car set up. By the second round, most of our team was up to speed and running pretty strong."

FRIDAY—CONTROLLED PRACTICE

AND QUALIFYING. "The track was pretty good during the first round. In 2WD, we had

eight cars in the Main after the first round was over, and in truck, we had four. At that point, we felt comfortable with how the



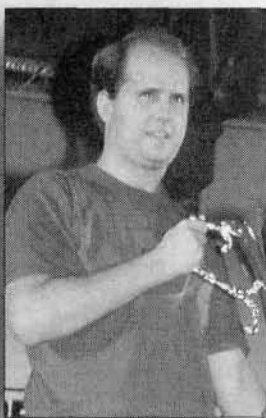
buggies were performing. They appeared to be very easy to drive. Again, in the truck class, we had only four, so we concentrated more effort on the trucks. By the second round for trucks, the track was much slower. A couple of guys got close to making the Main, but no one bumped in."

SATURDAY—QUALIFYING.

"We still didn't concentrate on our buggies, because we were comfortable with their performance. In truck, we had one more round to get someone in, so we grabbed the guys from Friday who didn't look as if they were going as fast as they could be and gave them more attention. A few guys were running fast, but the track was getting rougher, drier and dustier, and sometimes they didn't get a break. It was hard to get into the A-Main at this point. The track was going away so fast that no one wanted to change anything, because they wouldn't know what would happen when driving on the track in that condition."

SUNDAY—MAINS. "Everyone left everything the way it was in qualifying."

MARK PAVIDIS— TEAM ASSOCIATED



FRIDAY.

"I arrived late Friday night, so I didn't really have time to work on anything. I got set up to hit the track early the next day."

SATURDAY.

"I practiced a bit with my buggy to get

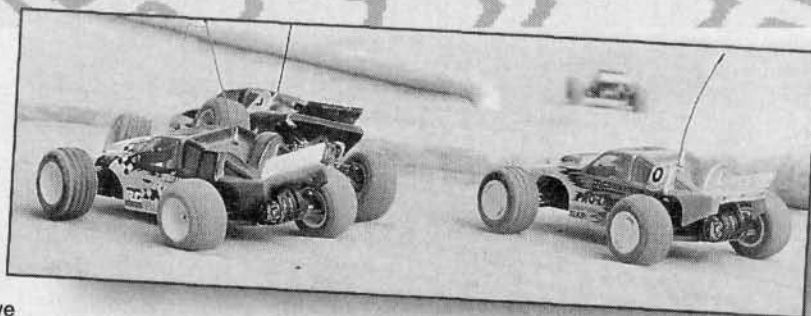
used to the track layout. I started with the standard setup that all our team drivers use:

- no. 2 pistons up front with 25WT oil and green springs;
- no. 1 pistons in the rear with 25WT oil and silver springs;
- no spacers in the front or rear shocks;
- standard 1-1 on the camber link up front;
- the rear camber link is on the inside hole on the rear bulkhead and the standard hole on the hub carrier.

"I ran that setup for a little while, then I switched to our Team's optional setup:

- no. 1 pistons up front with 30WT oil and green springs and one thin spacer;
- no. 1 pistons in the rear with 25WT oil and silver springs;
- 25-degree caster blocks;
- camber links remain the same.

After testing with that, I liked the way the car felt. All I needed to do now was find the right tire combination. At this time, the track was perfectly groomed, so I used Losi HT front tires and Pro-Line Flat Fuzzies in the rear. It felt pretty dialed in."



SUNDAY. "We had a club race at the track, and the track surface was still groomed fairly well, so I stuck with my setup."

MONDAY. "They started to let the track go, and toward the end of the day, it started to blue-groove, but it was still fairly smooth. I switched over to Losi wide-body front tires (Silver compound) and Pro-Line Square Fuzzies (M2 compound). I used Associated Traction Action on the rear tires only. I also took all I'd learned from the past couple of days using my buggy and put it on a racer sheet and made about 40 copies for anyone coming in late who needed help getting set up."

"I also started practicing and setting up my truck. We have two setups for the truck just like we have for the buggy. I decided to try the optional setup that's in the directions. It goes as follows:

- no. 2 pistons in the front shock, 30WT oil, Silver springs and one thin spacer;
- no. 1 pistons in the rear, 30WT oil, Green springs and one thin spacer;
- all camber links remain in the stock position.

I also started with Pro-Line Edge front tires (XTR compound) and Pro-Line 8090 rear tires (M2 compound). As the track started to blue-groove, I switched over to Pro-Line Edge front tires in M2 compound, and then I used Pro-Line Squared Fuzzies (M2) in the rear."

TUESDAY. "I passed out all the information sheets to everyone coming in, and then I worked with my setups all day."

WEDNESDAY. "First thing in the morning, I started running my buggy. I ran one pack with the setup I had been running, and then I altered my damping for my next run. I switched to 35WT in the front and 30WT in the rear. It seemed to work OK, but I wasn't 100-percent sure; I could've just had a really clean lap. I then went back to my original setup and found that it was a little easier to go fast. I didn't feel as if I was "driving on the edge" so much. After comparing all my lap times, I found that the optional setup was working the best. Even with all I had done though, I felt that the car had a little too much steering. That's when I began to experiment with a thin front sway bar. After putting one on my car and running a few packs to test it, I found that it took the dartiness out of the steering. I made up about 20 of them and handed them out to the other team drivers."

THURSDAY.

"At this point, the track was really starting to deteriorate. Late Wednesday, it started to dry out

and then crack, and then all day Thursday, it kept getting rougher and rougher."

Thursday was also controlled practice, so we had only two runs per class, and I wanted to make sure everything was right."

"I took my buggy out first and ran three laps with the sway bar and then three without it. The car handled better without it. By this time, the track was so rough that the sway bar didn't allow the suspension to properly absorb all the bumps. On my second run, the only change I made was to use race batteries, my race motor and new Losi and Pro-Line tires all around (sprayed with Traction Action). I also shifted the batteries toward the rear of the car; it seemed to work better."

"I made one change to my truck during the controlled practice: I spaced the rear hub in the middle (instead of having it all the way forward) to slightly lengthen the wheelbase. Doing this not only lengthens the truck slightly, which makes it more stable, but also takes away a little traction, loosens the rear end and improves on-power steering through sweepers. It seemed to work pretty well. For my second run in controlled practice, I switched to my full race setup as I did with my buggy."

FRIDAY—PRACTICE AND QUALIFYING.

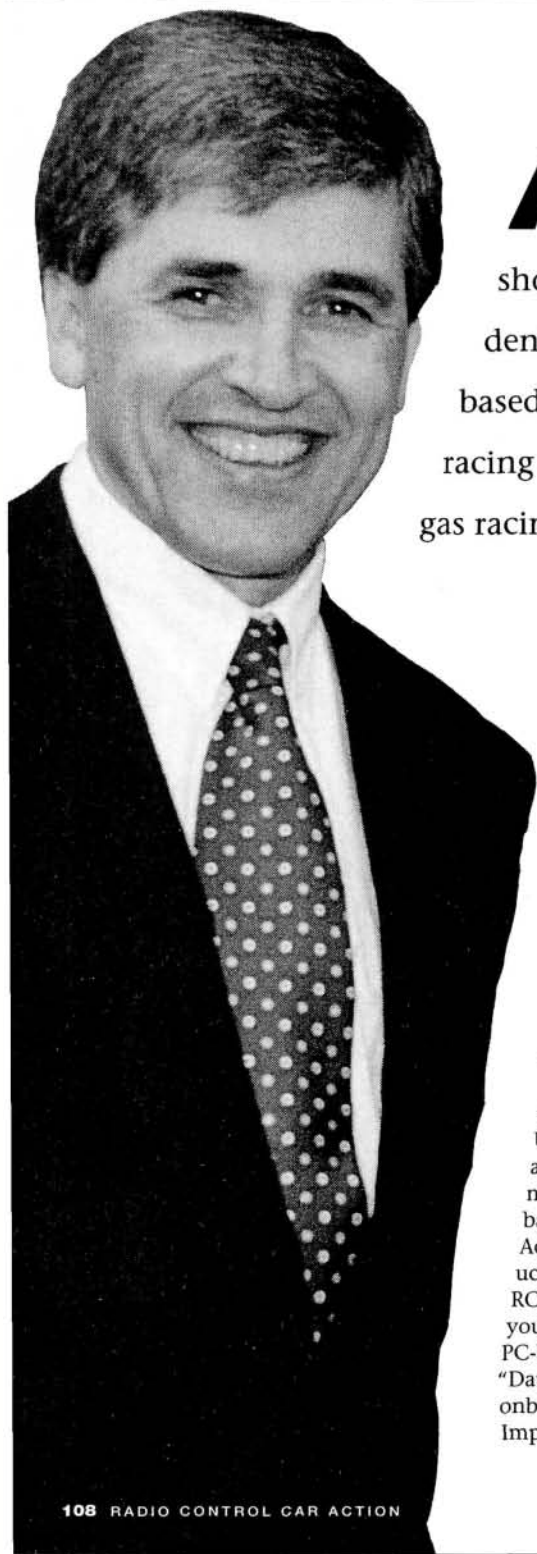
"I didn't touch my car and truck at all; I raced them as they were."

SATURDAY—QUALIFYING. "I kept the truck the same, but after running the buggy all day Saturday, it felt different. It felt as if the car had changed, but it hadn't; it was the track. I decided to try out one of Schumacher's Viscous Drives for Saturday to see if it helped smooth things out. It did, but I was having trouble telling where the powerband of the motor was at now; the car felt slightly mushy. I had bumped up and improved my standing in the Main though."

SUNDAY—MAINS. "During the Mains, I kept my truck the way it was. The track had been groomed and was a lot smoother, so I decided to take the Viscous Drive off my buggy and put the stock Associated slipper back on. It worked great for the first A-Main, but as the day progressed, the track got rougher and rougher again. I kept the standard slipper on, but looking back, I wish I had put the Viscous Drive back on." ■

Netherlands'

Nitro Man Takes Charge



ACCORDING TO Pieter Bervoets, gas racing is the ultimate adrenaline rush and the next logical step in the growth and maturation of the R/C car hobby. This should come as no surprise. Bervoets, the 46-year-old president and founder of Serpent Model Racing Cars* (a Holland-based manufacturer of high-performance 1/10- and 1/8-scale gas racing cars and accessories), has a vested interest in the future of gas racing and is one of the segment's biggest proponents.

by Frank Masi

Although the first R/C cars were gas-powered, electric cars have stolen most of the spotlight. Bervoets acknowledges the benefits of electric power, but believes that the speed, smell and sound of gas cars will win the hearts of many potential enthusiasts—that is, if they are exposed to gas; inadequate promotion of gas racing in the U.S. is the largest obstacle for Serpent to overcome.

But Bervoets is optimistic about the potential for gas racing in the U.S.—so much so, that he has made a significant investment in the formation of a brand-new, Florida-based division: Serpent USA. Additional investments in new products such as the company's "Virtual RC" game-port adapter (that enables your R/C transmitter to control any PC-based driving sim) and DRX-2000 "Data Logging System" (a radical, onboard telemetry system for Serpent's Impact and Excel cars) bolster Bervoets'

plan to widen the appeal of gas racing by merging the hobby with home computers.

A local news broadcast of highlights from the 1972 Nuremberg Toy Fair, including a segment on R/C model cars, inspired Bervoets to purchase his first kit: a Kyosho 1/8-scale on-road gas car. From then on, he was hooked on racing. Over the next five years, Bervoets campaigned scratch-built 1/8-scale cars of his own design, winning several national titles as well as four runner-up finishes in various European championships.

In 1979, Bervoets left a lucrative position as a sales rep for an aircraft and industrial fastening systems company to start his own company—Serpent. "I wanted to get more involved with the hobby," he says. "I thought: why not do what the others [PB, SG, Associated, Delta, etc.] do? I felt that I could do at least as good a job, maybe even better!"

Allowing history to answer the question of whether this was a prudent decision, Serpent has grown from a four-person operation in '79 to 28 today, and with the addition of the aforementioned Serpent USA and the growth of yet another branch of Bervoets' tree—Serpent Electronics—the most significant growth may

Serpent's Pieter Bervoets

talks gas racing, the U.S. and the future of the hobby

be yet to come.

Bervoets continued racing under the Serpent flag until his "retirement" in '87, during which time he added three European championships to his resume, as well as being a Worlds finalist in '81, '83 and '85. Throughout his racing career and during the formation of Serpent, Bervoets was also heavily involved with EFRA (the European race-sanctioning organization) as an executive member and treasurer, and with IFMAR (International Federation of Model Auto Racing) as president Ted Longshaw's "right-hand man" for many years, establishing rulebooks and requirements for body and muffler legality.

Bervoets can also be credited with the invention of the AMB auto-count system—the system used worldwide to provide accurate lap scoring for R/C cars and, more recently, for go-karts, Formula 1, DTM, Indycar, motorcycles and more. "In the early days of R/C racing, lap scoring looked more like a lottery; there were so many errors!" recalls Bervoets. "I suggested to my brother, who, at the time, worked for an electronics company, that he come up with a way to accurately track each car's laps individually. He came up with the first version of the auto-score system, which was of course very successful. He then went on to form his own company—AMB."

In addition to being a leading

force in the development of independent suspension technology, Serpent can be credited with the invention of the modern two-speed transmission and the unique and effective Centax clutch system.

A DIFFERENCE IN SCALES

The future success of $\frac{1}{8}$ scale, admittedly the foundation on which Serpent was built, will rely on the infusion of new blood into the sport.



Bervoets (shown at left with author) believes that $\frac{1}{10}$ -scale gas cars will attract many nitro newcomers.

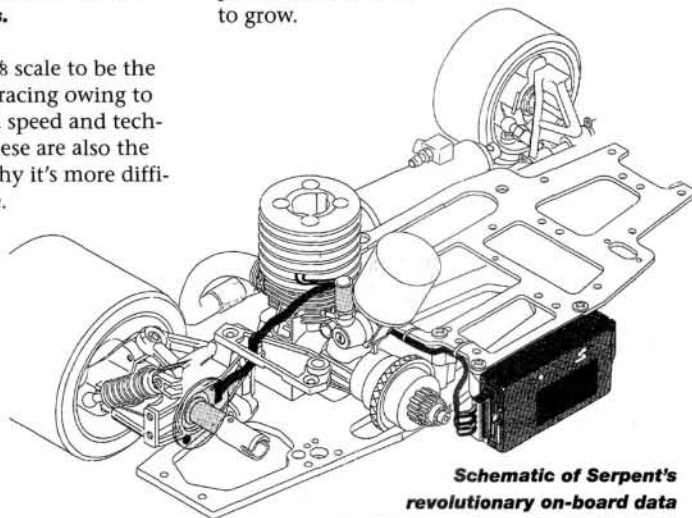
Bervoets considers $\frac{1}{8}$ scale to be the "Formula 1" of R/C racing owing to the sheer power and speed and technology involved. These are also the reasons, however, why it's more difficult to enter $\frac{1}{8}$ scale.

"The $\frac{1}{10}$ -scale class was created as a stepping stone to $\frac{1}{8}$ scale," says Bervoets; " $\frac{1}{10}$ scale offers the excitement of gas, yet it's much easier to manage and it's cheaper than $\frac{1}{8}$

scale. It allows racers to build experience with gas engines so that one day, hopefully, they'll move up to $\frac{1}{8}$ scale."

Although they're easier to build and race, Bervoets concedes that $\frac{1}{10}$ -scale gas racing cars aren't an ideal beginners' class. "Gas engines and the independent suspension technology are not all that easy to figure out by yourself," he says, "and unless you have some good help, I would suggest that beginners start with a Tamiya F-1 or such. These are excellent cars to build up technical and racing experience, and when you are ready to handle the power and excitement of a gas car, $\frac{1}{10}$ gas on-road is a very good class to consider."

The good news is that the popularity of $\frac{1}{10}$ -scale gas continues to grow. In fact, $\frac{1}{10}$ scale accounts for a large part of Serpent's worldwide sales. The highest percentage (70 percent) of Serpent's $\frac{1}{10}$ -scale sales is in Asia, which Bervoets attributes to the relatively small tracks available there. Racers in many Asian countries, however, view $\frac{1}{10}$ scale as a substitute for $\frac{1}{8}$ scale—not as a platform from which to grow.



Schematic of Serpent's revolutionary on-board data acquisition system—the DRX-2000.

"Fortunately, we have seen overall growth in $\frac{1}{8}$ scale that corresponds to the increase in $\frac{1}{10}$," says Bervoets. "This is what I hoped would happen!"

EXPLORING NEW TECHNOLOGIES

Bervoets has spent the past two years developing new technology, which will link R/C racing with computers and the Internet. "There is such a tremendous challenge there, if you just dare to imagine that computers and the Internet will become an integral part of our lives within two or three years—if not already!," he says. "What was once considered the biggest threat to R/C has now turned into the greatest challenge and opportunity."

"Before we went into electronics, our prospects were certainly limited. You could either make a new car for the class you were already in, or go into a new class. The first is really determined by the product life cycle and the competition; the second is not all that easy, especially not if you want to be number one. With our new

THE U.S. AND GAS RACING

On the subject of gas racing and the U.S., Bervoets comments that "One of the problems with $\frac{1}{8}$ scale in the States is that after Associated went into electric cars, the driving force disappeared as well." He may very well be correct; almost all the gas products used in the U.S. are imported, and the manufacturers don't seem very interested in the U.S. market. Serpent sees this as a tremendous challenge to re-establish gas racing in the U.S.

"With our new Florida-based operation, we will put a lot of effort into promoting gas racing in the U.S. by supporting the distributors, dealers, racers and organizers," he says. "We are not going to fight the established electric car market; we must provide for the next step up, which is $\frac{1}{10}$ gas and ultimately, $\frac{1}{8}$ gas. After all, what is R/C racing without having raced the ultimate class?"

LAMBERTO COLLARI

At the most recent IFMAR Gas World Championships, defending champ Lamberto Collari captured his fourth consecutive world title using a Serpent Excel Mk2. Followers of gas racing were somewhat shocked to learn that Collari had switched his affiliation from the Italian company BMT (Collari is Italian and has won his past three championships using BMT cars) to Serpent.

"It is obvious that a world champion wants the best product and chooses to run our car,"

Bervoets comments. "Good choice! But I can imagine why some people might be confused. After all, he is Italian and from Bologna, and that is exactly where our competitor, BMT, is located. I believe he honestly wanted to change cars to prove to himself and to the world that he could also win with another car, and he did."

"Lamberto is not a 'works' driver in the sense that he works for the car manufacturer. He was not for BMT, and he is not for Serpent. He runs a model shop in Bologna, and his main business is the Collari engine line. He

likes working with us, and although it is difficult to communicate [Bervoets has taken Italian lessons to help communicate with Collari] we get along very well, and Michael Salven [Serpent's chief engineer and works driver] and Lamberto are very good friends."

THE FUTURE OF R/C

Bervoets admits that it's difficult to predict if and how R/C will change in the future. "I think that the change to gas-powered cars will continue to go on as gas products become better and easier to handle, and I also see a further change from off-road to on-road. This has already started in Asia, and it's quite possible that this could also happen in the United States. There are more and more on-road tracks springing up."

Bervoets also predicts an influx of new racers from the computer side through products such as his data-logging system and Virtual RC game-port adapters, which should appeal to computer users who aren't yet aware of the attraction of R/C.

"Look at the combination that Serpent has to offer today," Bervoets says. "R/C cars for actual, on-site fun; data-logging technology to take home for after-racing hours; TSN [Team Serpent Network—Serpent's online site <http://www.serpent.nl>] and the Internet to communicate all kinds of information about your car and your hobby, and then there is the Virtual RC game-port adapter to fill the remaining hours on your race simulator, having great fun on the computer!" Bervoets calls this a full-circle hobby, and he may have the right idea.

THE FUTURE OF SERPENT

"We will continue to focus on the Internet as a very important means of communication, especially in the future," says Bervoets, "Provided this is done properly, the whole industry could benefit from it: manufacturers, dealers, racers, organizers. Serpent USA will grow and re-establish gas racing in the USA, and if our expectations come true, we will see a sound gas on-road racers base of around 10,000 a few years from now."

*Addresses are listed alphabetically in the Index of Manufacturers on page 181. ■



Bervoets demonstrates the DRX-2000's capabilities to Air Age systems manager Gordon Oppenheimer.

electronics, I see new markets outside the R/C industry as well, and we will certainly explore some of them."

For example, Serpent plans to develop a version of its Data Logger for the go-kart market by the end of the year. And with the Virtual RC game-port adapter, Serpent is stepping outside the limited gas market with a product that can be used by everybody who own an R/C transmitter and receiver.

"It looks like the world is our market!" says Bervoets.

HOW TO

apply decals

*Stickin' it to your
R/C Car's body*

ACTUALLY, THEY'RE STICKERS

Most R/C car kits include a set of stickers for the outside of the body. These are often referred to as "decals," but this word more properly describes water-applied "slide-on" transfers such as those that come in most plastic-model kits. Decals work just as well on polycarbonate bodies as on static models, but they won't stand up to the thrashing most R/C car bodies endure. Most high-quality R/C stickers are screen-printed on high-quality, flexible Mylar, and many are finished with a protective clear coating, which resists scratching, dirt and chemicals. The Mylar is treated with a clear adhesive on the back, and it's protected with a non-stick-paper backing sheet. This backing sheet is the smart "decalist's" best tool, as I'll explain.

by Mike Ogle

AFTER YOU'VE MASTERED the painting part of finishing your car body, you'll have to apply stickers. We've all seen great-lookin' cars that are painted solid colors and snazzed up with cool, strategically placed stickers. And, of course, we've seen just the opposite—hideous-looking cars that have 3 pounds of crooked, peeling stickers haphazardly slapped on. Here are some easy tips for applying stickers that will ensure that your car won't look like a rolling ransom note on wheels.



1 To start your sticker job the right way, clean all the dirt (or paint overspray) off your car body. Stickers don't stick very well to a body that has dust, grime, or even fingerprint oil all over it. For maximum adhesion, I use denatured alcohol to strip the gunk and get down to unadulterated Lexan. Before you do anything, thoroughly wash your hands. If you have anything on your fingertips, the sticky-back adhesive will pick it right up.



3 Trim out the largest stickers first. Most cars have matching stickers for either side; trim these out in pairs. I find it's a lot easier to position the matching stickers on one side, then the other, instead of finishing one side completely, only to miss (or lose) one of the stickers for the other side. Such a lopsided job brings out concours judges' red pencils!

Although I've seen some stickers with the individual markings separately die-cut (called a "kiss-cut" in printer's terms, because the top sheet is cut, but not the backing sheet), most R/C car's sticker sheets are printed on one large sheet, and you have to cut out each one individually. I recommend the use of a pair of sharp, short-blade scissors, such as Lexan body-trimming scissors. These are nimble enough to cut between closely placed stickers and allow you to trim the individual emblems as closely as possible. You can use a hobby knife to trim out each one, but be sure the blade is new and sharp. Mylar is actually pretty tough stuff, and an old blade will not always make a clean slice, except, of course, through the tip of your index finger after it slipped because you applied way too much force to get the dull thing to cut!



After you've trimmed your sticker, carefully remove the protective backing sheet by dragging your fingernail across the edge of the sticker to separate it. It should separate easily, but if it doesn't, sharply fold one small corner over. This will usually remove even the most stubborn sticker from the backing sheet and enable you to peel it from that loosened corner.





5

Now that you've peeled the sticker off, what do you do with it? Well, unbelievable as this may sound, I suggest that you put it right back on the backing sheet—in a different position. Just stick the very edge of the sticker to the slick side of the backing sheet, and use the backing sheet as a kind of "positioning tool" to "sight it up." The backing sheet is the best place to "park" the decal while you're positioning it: it's clean, it's smaller than your fingers so you can see what you're doing and, of course, the sticker will easily come off this sheet once you have it in position.

6



Using the backing sheet as your positioning tool, carefully align the sticker. Use the lines of the car body as a guide, or use a strip of masking tape to determine your "baseline." When you have it in the right position, touch one edge to the surface of the car body and stick it, then use your finger to sort of "roll" the sticker onto the car to avoid trapping air bubbles underneath it; this is especially important when applying stickers over large body creases.

7



On tough areas such as those with body creases, start at the top or the bottom edge, and rub the sticker parallel to the body seam, making sure it rolls fully into the crease, as opposed to letting the sticker try to "bridge" the crease. Most stickers are flexible, and you may be able to stretch it and burnish it down into the seam, but by the next day, it will probably have "un-stretched" and lifted itself right out of there.



There are a couple of things you can do to a sticker that just won't lie down without buckling, especially because you're applying it to a surface that curves across and down. Try heating the sticker with a hair dryer to make it softer and more flexible. A heat gun—like you would use to shrink-wrap batteries or MonoKote an airplane—will really soften up a sticker quickly, but unfortunately, it will do the same to the Lexan body about a half second later. It's a little risky, so just use a regular hair dryer!

8



10

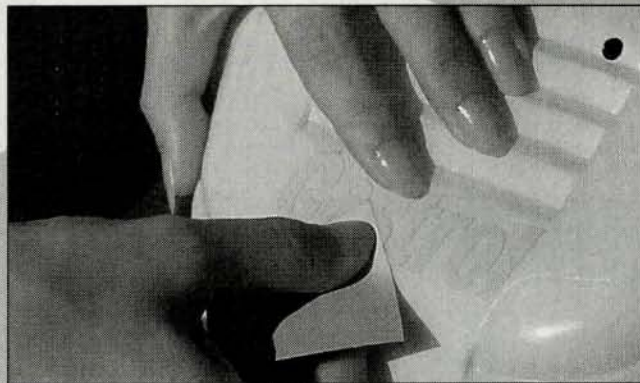
If you have a sticker that lies down well except for one little buckle or a small, trapped air bubble, an inconspicuous slice along the length of the buckle will overlap the two sides of the cut area a bit and flatten them. Once you've burnished the sticker, the small cut will practically disappear.

There's a new product on the market that can help you avoid trapping air bubbles and allow you to sort of "scoot" the sticker around before it adheres permanently. Autographics* Sticker-On is the stuff, and I wouldn't even think of doing an extensive sticker job without it anymore. If you have large areas to cover (like most Tamiya touring cars), I recommend that you pick up a bottle.

9



HOW TO APPLY DECALS



Once everything is in place, you may want to burnish each sticker thoroughly. The best thing I've found to use as a burnishing helper is, again, the backing sheet. If you use your fingernail, or a Popsicle stick, or the like, to rub the decal down hard, you risk scratching it. But if you put the protective backing sheet between the sticker and your burnishing tool, it will protect it from damage.

11

12

On the Tamiya Supra, stickers have to be applied to a set of louvers on the hood. Fortunately, Tamiya realized that this would be a nearly impossible task, so they made a two-piece transfer. The main sticker has a little window (shown here); a corresponding decal fills in the window—pretty slick!

PARMA Ready for the Street or Strip...

1/10 SCALE

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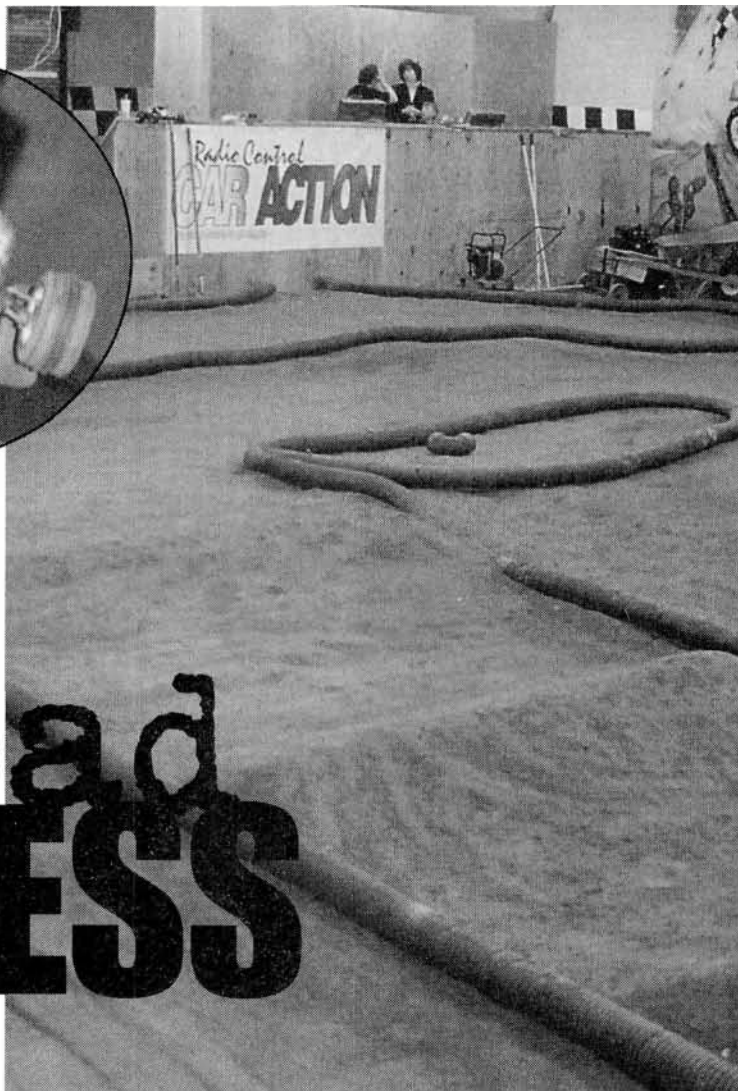
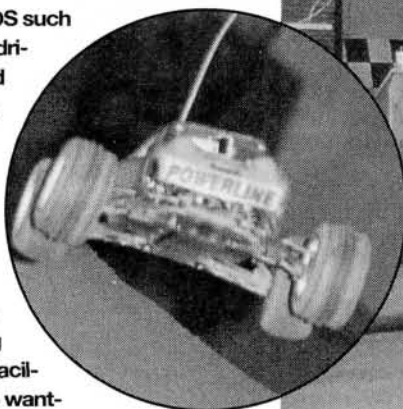
FINAL THOUGHTS

Finally, although most stickers are pretty tough, they can be damaged. Some motor sprays dissolve or smear stickers, and excessive heat can soften their adhesive. But generally, anything that can potentially damage stickers can probably also hurt the Lexan car body, so just take standard precautions, and your bitchin' new sticker job should last as long as the body. Hard work has its rewards.

*Addresses are listed alphabetically in the Index of Manufacturers on page 181.

WHEN R/C LEGENDS such as Trinity* factory drivers Brian Kinwald and Greg Hodapp come to town, it's usually for a big race in

which huge titles are up for grabs. But such was not the case when these top-ranked racers came to the East Coast to attend a club race at Long Island R/C Raceway in Long Island, NY. As you can imagine, the facility was jam-packed with racers who wanted to catch a glimpse of Brian and Greg in action—not to mention share the dirt with them! To help the club racers tune their motors for maximum performance, Trinity also took along its entire factory-support

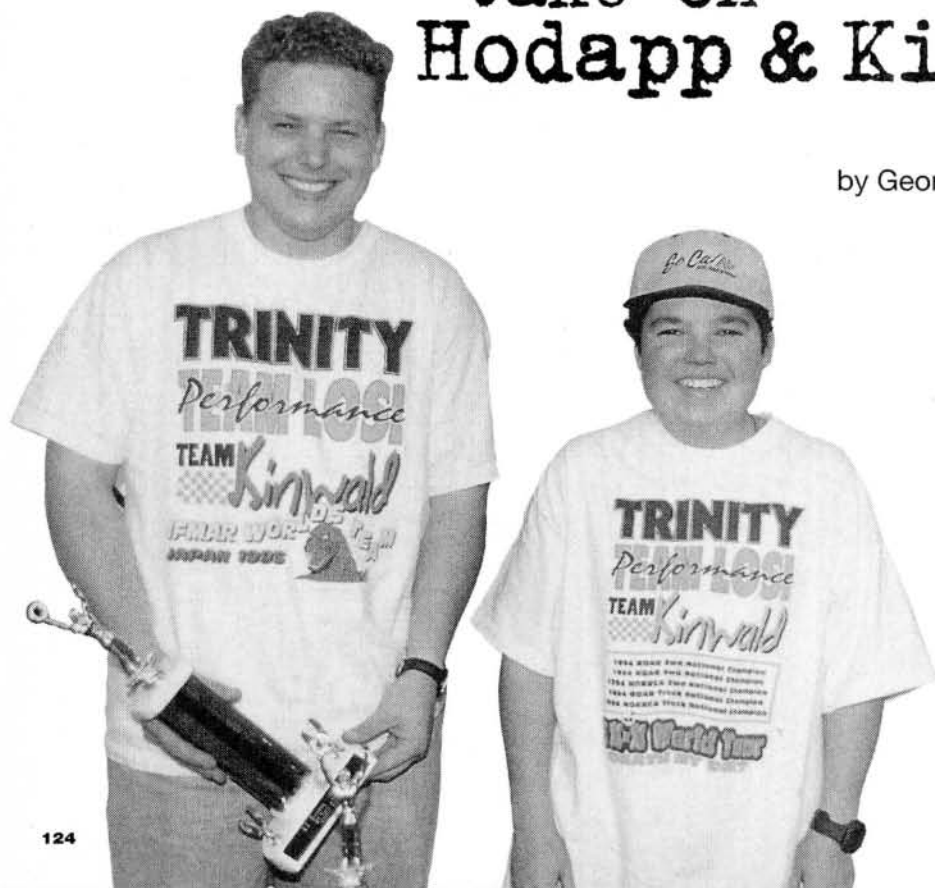


TRINITY

Off-Road MADNESS

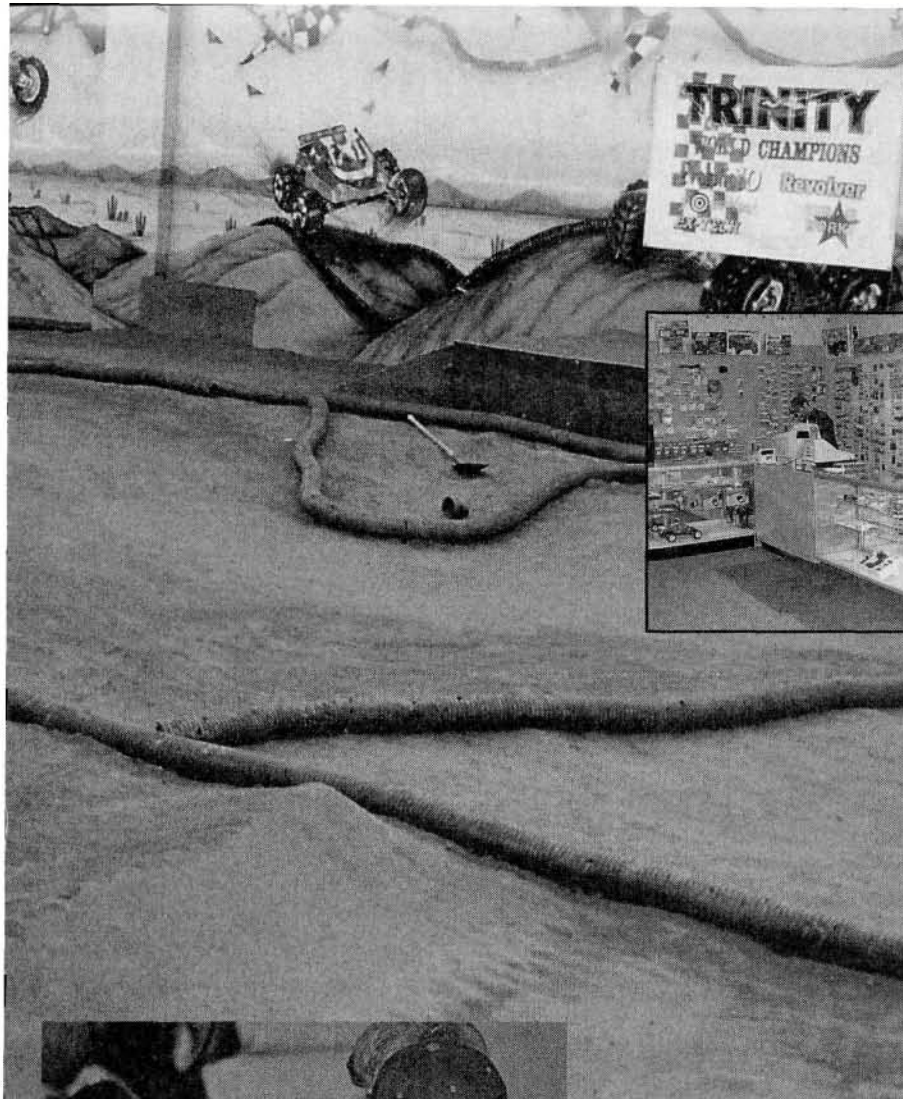
Local racers
take on
Hodapp & Kinwald

by George M. Gonzalez



team, including the magic motor wizard himself, Neal McCurdy. The lines were long, but Neal made sure everyone received equal attention, and every racer left with a tweaked-out motor in hand.

Brian and Greg also provided valuable setup tips, gearing advice and even driving lessons. Of course, these R/C celebrities signed autographs and posed for pictures, but most of all, they had fun racing with all the local expert and novice racers. Frank Masi, John Howell and I attended the event, and we spent some quality time with these two formidable drivers bench-racing and having an all-around good time.



The Track

Long Island R/C Raceway is one of the premier off-road tracks in the area. The facility is becoming well-known for its challenging track layouts and professional racing atmosphere.

The large indoor track features long straightaways, high-speed sweepers, elevation changes, doubles, triples, tabletops, moguls and many other obstacles that make it a blast to race on. The track layouts are changed every month, so it's always interesting to race there.

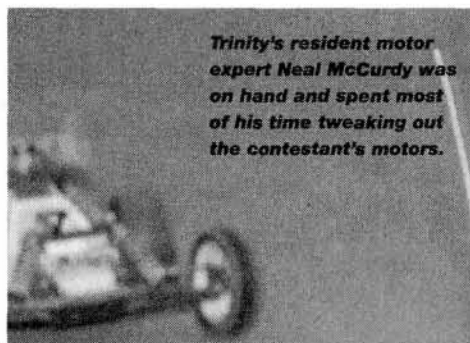
The facility also features plenty of parking, a well-stocked hobby shop, video monitors for up-to-the-minute racing information, AMB lap counting and tons of pit tables with electrical outlets. The track is open Tuesday through Thursday and holds club races three days a week as well as three days of open practice. If you're ever in New York looking for a place to race, check this place out; you'll be impressed.

Long Island Raceway, 168 Broad Hollow, Farmingdale, NY 11755; (516) 845-7223.

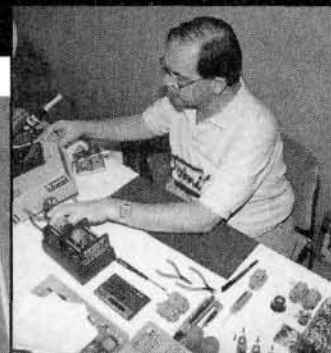


Top: a few young racers bench-race during one of the breaks.

Right: Team Losi-sponsored driver Jeff Kinoo played the tunes, told some jokes and put on an awesome performance in the Mains.



Trinity's resident motor expert Neal McCurdy was on hand and spent most of his time tweaking out the contestant's motors.



OFF-ROAD MADNESS

As expected, the race was a total success, and many East Coast racers had the rare opportunity to meet and race with Brian Kinwald and Greg Hodapp (a privilege that can usually be had only by West Coast residents). I wouldn't be surprised if some local racers lowered their lap times considerably just from observing these guys in action; of course, all the setup tips Brian and Greg passed along also helped.

The staff at Long Island R/C Raceway did a fine job of hosting the event, and we commend the folks at Trinity for flying these guys out to attend a small local club race. Who knows? Maybe Brian and Greg will show up at your local track some day; it could happen!

* Addresses are listed alphabetically in the Index of Manufacturers on page 181. ■

W I N N E R S

SPORTSMAN

Pos	Qual	
1	1	Geoff Lelong
2	2	Jonathan DiMaio
3	3	Mike Paradiso
4	4	Tom Palminteri
5	5	Lex Skipka
6	DNS	Little Bill

STOCK BUGGY

Pos	Qual	
1	1	Brian Kinwald
2	2	Greg Hodapp
3	3	Dave Graboski
4	5	Jeff Kinoo
5	9	Big Al
6	6	Jimmy Franz
7	4	Todd Lewis
8	8	Rob Betts
9	7	Rob Meyer Jr.
10	10	John Roth

STOCK TRUCK

Pos	Qual	
1	1	Rob Cutman
2	4	John Feeney
3	3	Todd Lewis
4	5	Frank Masi
5	2	Rob Betts
6	8	Jimmy Franz
7	6	Joe Sammut
8	9	Royce Berrio
9	7	Michael Kruck
10	10	Rick Icker

MODIFIED BUGGY

Pos	Qual	
1	1	Brian Kinwald
2	2	Greg Hodapp
3	4	Craig Chin
4	10	Jason Portuese
5	3	Dave Graboski
6	5	Rob Meyer Jr.
7	7	Rob Betts
8	8	Todd Lewis
9	9	Rob Cutman
10	6	Jimmy Franz

MODIFIED TRUCK

Pos	Qual	
1	2	Greg Hodapp
2	1	Brian Kinwald
3	4	John Feeney
4	9	Ed Corsini
5	7	Rob Meyer Jr.
6	5	Todd Lewis
7	10	Rob Cutman
8	6	Jimmy Franz
9	8	John Noon
10	3	Rob Betts

4WD

Pos	Qual	
1	1	Nick Mateo
2	3	Jack Bonhomme
3	4	Mike Knight
4	5	Darryl Lee
5	8	Len Williams
6	7	Marcus Q. Woodlyn
DNS	2	Clarence Barbour
DNS	6	Bob Horlocher

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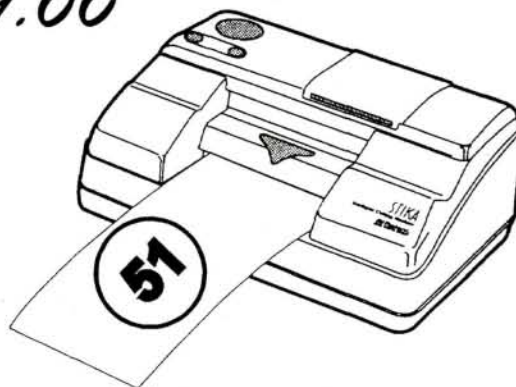
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HOW TO

Choose the Right Gear Ratio

by STAN VANDRUFF

Learning how to choose the right gear ratio is a high priority for racers. Gearing affects acceleration, top speed, motor life and battery life, not to mention who wins!

CALCULATE THE GEAR RATIO

Calculating your gear ratio is simple, but first, define which gear ratio you are talking about. Although many people think that the *pinion/spur ratio* is all they have to worry about, you should base all comparisons on your *final drive ratio*. This is the ratio between the motor shaft and the axle that takes into account every gear in between—the pinion, spur and transmission.

To find the pinion/spur ratio, divide the number of teeth on the spur by the number of teeth on the pinion. For example, if you have a 21-tooth pinion and an 80-tooth spur, your pinion/spur ratio would be $80 \div 21 = 3.81$. You write the ratio as 3.81:1 and say it "3.81 to 1." To calculate the final drive ratio, you take the pinion/spur ratio and multiply it by the transmission ratio. If your transmission has a ratio of 2.25:1, the final drive ratio would be $3.81 \times 2.25 = 8.57$:1.

You should be able to find the transmission ratio in your instruction manual. If you can't, disassemble the transmission, and calculate the ratio

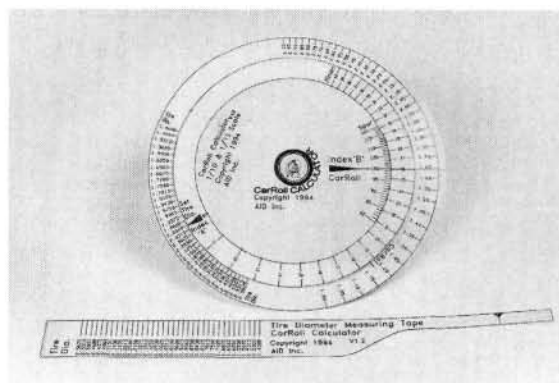
yourself. For a belt-drive transmission, the ratio is simply the number of teeth on the larger pulley divided by the number of teeth on the smaller pulley. For a three-gear transmission, calculate the ratio between the top and bottom gears (the middle "idler" gear has no effect on the tranny's ratio).

Pan cars don't have transmissions, so their final drive ratio is the same as their pinion/spur ratio. *Rollout* is the most useful measure on a pan car. Not strictly a gear ratio, rollout is the distance the car will roll with one revolution of the motor. To find it, divide the tire's circumference by the final drive ratio. Rollout is important because foam tires wear down and need to be trued periodically. As the tire diameter changes, change your gear ratio to keep rollout constant.

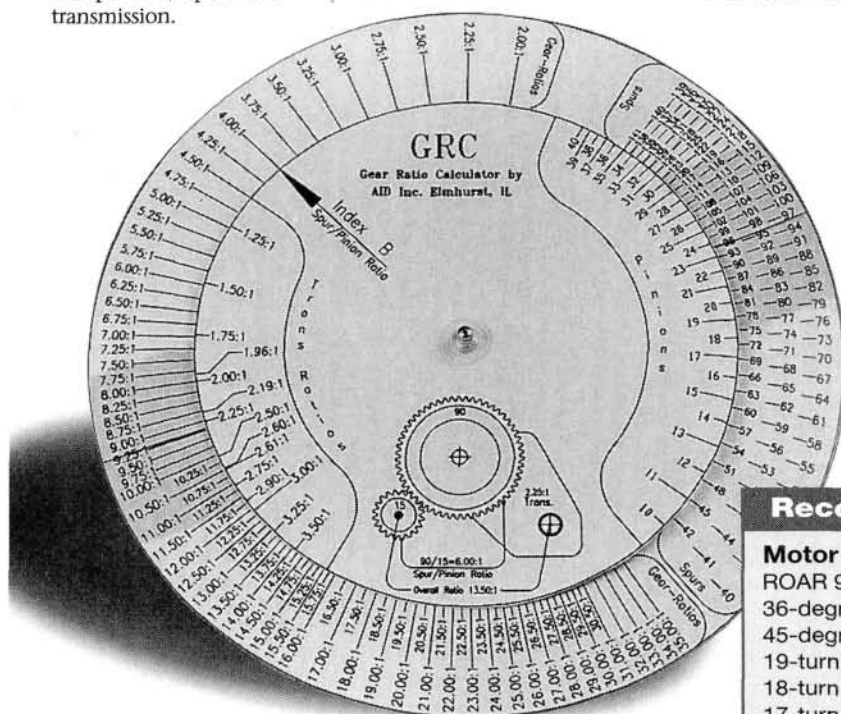
WHERE TO START?

Refer to the gear-ratio chart (courtesy of Jack Johnson at Team Losi), and use it as a starting point for off-road trucks and buggies.

The numbers are conservative; they will give you a safe place to start. The next logical step is to find out what other drivers are running at the same track. Be sure to ask them for their final drive ratio. Common questions heard in the pits are "What gears are you using?" or "Which size pinion are you running?" If you ask only for pinion size, or the pinion/spur



Assembly-Instructions & Drawings makes this CarRoll calculator; it's used to calculate pinion/spur ratios and rollout. It also includes a flexible tire-diameter measuring tape.



AID also sells this handy gear-ratio calculator that makes working out gear ratios a snap.

Recommended Off-Road Gear Ratios

Motor	Gearing (Buggy)	Gearing (Truck)
ROAR 91 stock	7.66:1	9.98:1
36-degree stock	8.00:1	10.40:1
45-degree stock	8.36:1	10.93:1
19-turn modified	7.08:1	9.18:1
18-turn modified	7.35:1	9.57:1
17-turn modified	7.67:1	9.98:1
16-turn modified	8.10:1	10.44:1
15-turn modified	8.60:1	10.94:1

ratio, you won't get enough information to set up your car the same way. You can't assume that everyone is using the same size spur, or that all transmission ratios are the same. Even pan cars may have tire diameters that differ significantly.

Most racers I know keep a chart in their toolbox that lists the gear ratios for common pinion/spur pairs. This is useful only when making adjustments to your own car, or for sharing information between owners of identical cars. Far more useful for your toolbox is the Gear Ratio Calculator by Assembly-Instructions & Drawings* (AID). This is a circular slide rule that greatly simplifies calculating the pinion/spur ratios and final gear ratios.

FIND THE OPTIMUM RATIO

Now that you know how to calculate gear ratios and you have an idea where to start, how do you find the optimum ratio? The optimum ratio is the combination that will let you go fast, drive well and, of course, finish the race. It depends on whether you drive a truck or buggy, which kind of motor and battery you use and the track layout. The only way to find the best ratio is through scientific experimentation. Science isn't scary; it isn't even hard. You just have to be consistent and keep good notes.

Here's what you need for your experiments:

- a selection of spur and pinion gears;
- several charged battery packs;
- a timer;
- a lap counter;
- a way to measure energy left in your battery.

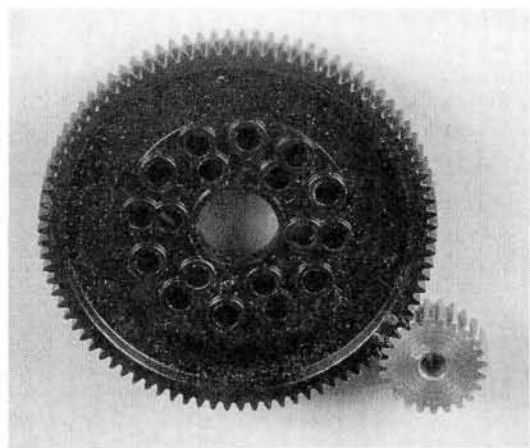
You should have a wide range of gears to play with, but because you won't be using many of them after the experiment, you might try to borrow some from your buddies. Your battery packs should all be the same capacity, e.g., all 1400SCRs and give you similar run times. A wristwatch is all you need for a timer. Your lap counter could be a buddy with paper and a pencil. The trickiest part of this experiment is measuring the juice left in your battery. A Competition Electronics* Turbothirty would be ideal. For the less affluent, a simple bulb discharger is fine. Just consistently discharge your battery at 20 to 30 amps and measure how long it takes.

Here's what you are looking for:

- Your battery should last for 4 minutes plus enough time to complete one extra lap. You may also want a few extra seconds as a buffer. If your battery lasts much longer than this, you are wasting power that could help you win.
- As you approach the perfect gear ratio, you should be able to get an extra lap or two. If you can measure lap times, you should at least see your lap times decrease.

EXPERIMENT

Set up your car with the suggested gear ratio. Drive as if you were to race for 4 minutes, and count the number of laps you turn. At the end of 4 minutes, stop your car and measure how much battery you have left. Feel your motor. You should be able to keep your hand on it for several seconds. In



PHOTOS BY STAN VANDRUFF

On all direct-drive pan cars, the final gear ratio is determined by dividing the number of teeth on the spur gear (left) by the number of teeth on the pinion gear (right).

your notebook, write down the number of laps, how much battery you have left and how hot the motor is.

Because the gear ratios in the chart are conservative, you should be able to gear up with no trouble. Unless the motor is too

GLOSSARY

■ **Final drive ratio.** The overall gear ratio, including pinion, spur and all the gears in the transmission.

■ **Gear down.** To reduce pinion size or increase spur size. This increases the final drive ratio.

■ **Gear up.** To increase pinion size or reduce spur size. This lowers the final drive ratio.

■ **Overgeared.** The final drive ratio is too low, the pinion is too large or the spur is too small. The motor has to work extra hard and is likely to overheat.

■ **Pinion.** The small gear that is attached to the motor shaft.

■ **Pinion/spur ratio.** The number of teeth on the spur divided by the number of teeth on the pinion. Technically, the pinion/spur ratio should be the result of the pinion divided by the spur, but we calculate it other way around so you get a number greater than "1."

■ **Rollout.** The distance a car rolls for each revolution of the motor. It's the tire's circumference divided by the final drive ratio.

■ **Spur.** The big gear attached to the transmission input shaft (or to the axle on a pan car).

■ **Transmission ratio.** The gear ratio between the transmission's input and output shafts.

■ **Undergeared.** The final drive ratio is too high, the pinion is too small, or the spur is too large. Your top speed will be diminished, and you may have too much acceleration for track conditions.

BulletProof Gear Finder v1.4

File Help

GearRatio, RollOut and Lap Finder

Pinion Gear 30.0 F1 Using Ratio and Spur

Spur Gear 100.0 F2 Using Ratio and Pinion

Clear All - F10

Tire Diameter (in) 2.200 F4 Using Ratio and Roll Out

Roll Out (in) 2.074 F5 Using Tire Dia. and Ratio

System
☒ English
☐ Metric

Number of Laps 16.5 F7 Using RPM, Length and Roll Out

Length of Track (ft) 1070

Motor RPM at Load 25500

Gear Ratio 3.33 F3 F8

Gear Box Ratio 1.00

Major Taylor Valodrome - Spring '94
 13 Quint - 17 Laps @ 4:10.76
 Qualify: "A" Main - 7th Position

F# = Solve Buttons

Comments

Roll Out
 Tire Dia.
 Spur + Pinion = Gear Ratio

"The Gear Helper" by Hank Hagquist is one example of how you can use the Internet to help you to calculate gear ratios.

Need More **HELP?**

It isn't hard to calculate gear ratios, but there are some inexpensive tools that make it even easier. My favorite is the gear-ratio calculator by Assembly-Instructions & Drawings. This is a circular slide rule designed to calculate pinion/spur and final-drive ratios for off-road trucks and buggies. It's made of laminated card stock and has a list price of \$9.95. Although you must cut it out and assemble it, it's an extremely useful tool for the price. With this little gadget, you can easily check your gear ratios and compare yours with what others are running.

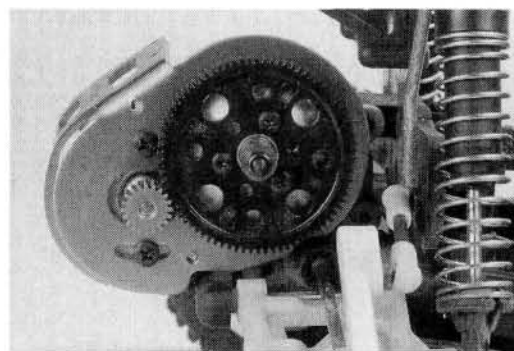
I've also used their CarRoll Calculator designed for pan cars. It calculates pinion/spur ratios and rollout, and it comes with a flexible ruler that you use to measure the tires. If you run a transmission car or truck with foam tires, you might like their UniRoll Calculator; this combines the gear-ratio calculator with rollout.

Another interesting tool for pan-car racers is a computer program called "Gear Helper" by Hank Hagquist. It runs on Microsoft Windows. Besides finding the usual pinion/spur and rollout calculations, Mr. Hagquist has come up with a unique way to find a gear ratio by using the track length and a motor-dyno reading. The program is free; just contact Hank.

E-mail: hank545@delphi.com

hot, or your battery dumped, gear up one tooth on the pinion and repeat the experiment. Do this until your batteries dump or your motor gets too hot (at that point, you have overgeared). If the motor overheats, don't keep running your car; you could ruin it. When you find the pinion that causes you to be overgeared, drop back one tooth; this one will be the "keeper."

Fine-tune the ratio by changing the spur. Because the spur has more teeth, a one-tooth change gives you a finer adjustment on the gear ratio. For example, a one-tooth change on a 21-tooth pinion is $\frac{1}{21}$, or a 4.8-percent change, whereas a one-tooth change on an 80-tooth spur would be $\frac{1}{80}$, or a 1.2 percent change. Select a spur with one less tooth and repeat the trial. Keep trying smaller spurs until you have overgeared again. At that point, just add one tooth to the spur, and you've finished.



On off-road vehicles, you have to multiply the pinion/spur ratio by the tranny's final gear ratio.

When you've found the ideal gear ratio, see whether you can replace the spur and pinion with smaller gears while you keep the same ratio. Smaller gears weigh less and have less inertia. You will have slightly improved acceleration and braking performance.

If you change motors or batteries or go to a different track, you'll have to repeat this experiment. But armed with good notes and a little practice, you'll be able to pick the right gear in no time. Then you'll spend more time in the winners' circle!

**Addresses are listed alphabetically in the Index of Manufacturers on page 181.*

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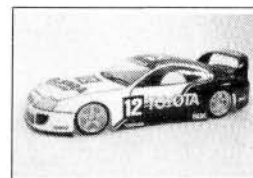


Here are just a few of our bodies for Tamiya, HPI, Yokomo, Kyosho, and Predator Sedans!

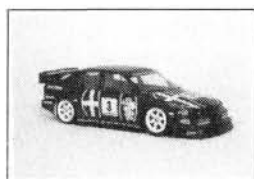
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This section is also available in Model Airplane News

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

This is YOUR PAGE—YOURS!! It belongs to you—the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—on-road and off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



Tamiya Does it Again

The Tamiya Championship Series Race 23 was hosted by Orange Blossom Hobbies in Miami, FL. A total of 35 racers turned out for the day's events, and they were cheered on by 34 spectators.



F1

1. Mike Contreras
2. David Franklin
3. Gus Bustamante
- Top Rookie—Omar Maldonado
- Best of Show—Chris Marsh
- Top Qualifier—Mike Contreras

FWD SEDAN

1. Randy Deppen
2. Rick Schwartz
3. Jack Acosta
- Best of Show—Jack Acosta
- Top Qualifier—Randy Deppen

4WD SEDAN

1. Rob Michael
2. Gus Bustamante
3. Danny Horta
- Best of Show—Tony Trescastro
- Top Qualifier—Danny Horta

MINI

1. Jim Terry
2. Adam Shahar
3. Dennis Gundersdorf
- Best of Show—Adam Shahar
- Top Qualifier—Louis Patterell

call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
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Tamiya R/C Championship Series
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Kyosho R/C Sport Racing
(800) 682-8948 ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street Spec Series
(908) 862-1705

Canadian Indoor Nationals, eh?

Honda House Motor Speedway in Chatham, Ontario, Canada, hosted the 1st Annual Canadian Grand Prix Formula Indoor Nationals. Here's a look at the winners.

FORMULA TAMIYA

1. Rob Betteridge
2. Randy Druer
3. Rob Franklin
4. Scot Orme
5. Ken Franklin
6. Mic Cieslar

FORMULA 1

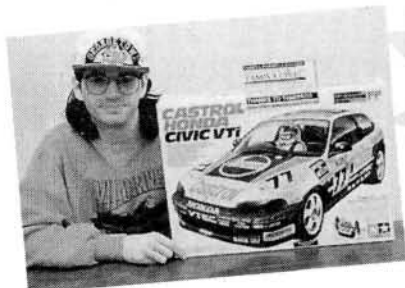
1. Wayne Vince
2. Dwayne Franklin
3. Chris Stephens
4. John Elliot
5. Aaron Bambach
6. Darrin Charbonneau

FORMULA 2

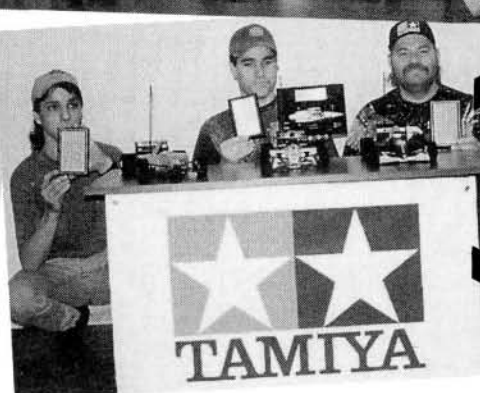
1. Wayne Vince
2. Dwayne Franklin
3. John Elliot
4. Rob Betteridge
5. Chris Stephens
6. Randy Druer

TOURING CAR

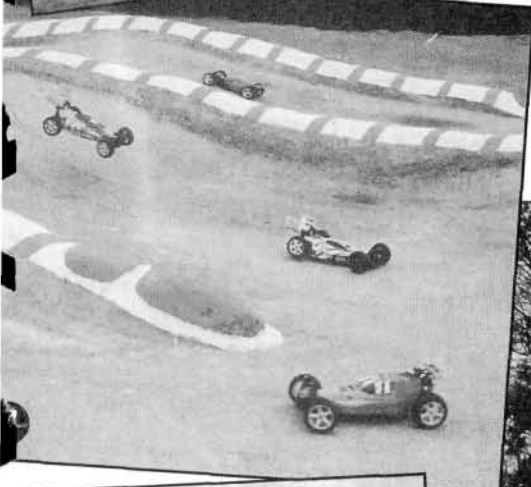
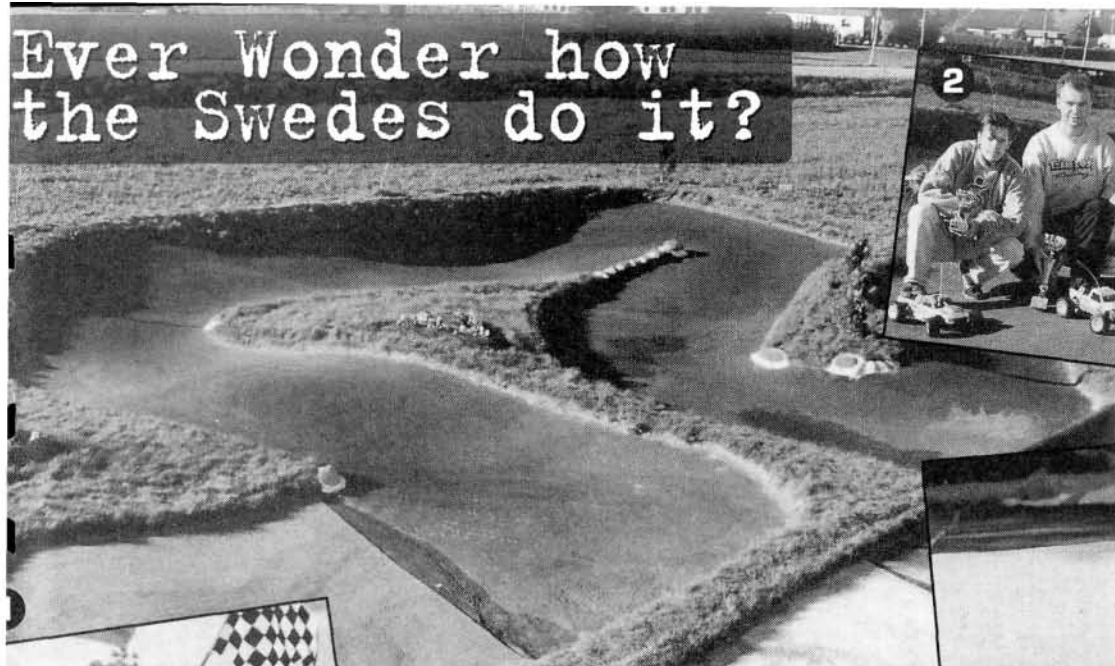
1. Aaron Bambach
2. Sunny Lee
3. John Fung
4. Raye Field
5. Mark Rodney
6. Chuck McKinley



Clockwise from top right—F1 winners (left to right): Dwayne Franklin, Wayne Vince and Chris Stephens; Formula Tamiya winners (left to right): Rob Franklin, Rob Betteridge and Randy Druer; F2 winners (left to right): Dwayne Franklin, Wayne Vince and John Elliot; Ken Franklin was the Tamiya Draw winner.



Ever Wonder how the Swedes do it?



5

PROCAR Speedway in Veddige, Sweden, has an awesome racing season planned. They invite you to join them this summer and race against the best drivers in Sweden.

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The club uses AMB time scoring and offers a full-service pro shop. If you're interested in racing at PROCAR, contact Lars Nordin at Industrigatan 8, 430 20 Veddige, Sweden; 46-340-387-84.

1. The oildirt and AstroTurf™ sections of the track.

2. Winners of the 1995 PROCAR Open (left to right):

Mattias Pettersson, Niklas Hakansson, Eirik

Andreassen and Torbjorn Dohler. 3. Eirik Andreassen's buggy flies to victory in 2WD. 4. The AMB scoring system at work.

5. The concrete part of the track also features AstroTurf. 6. The drivers' stand. 7. Heated competition in 4WD Modified. 8.

This Cat 2000 shows its flexibility after taking the double jump.





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Chris's

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This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chrisc@airage.com

Cool (According to Chris)

I've gotten more than a few letters saying, "Chris, where were your picks in the Top 10 issue?" So, for those of you who seem interested in the inner workings of my head, here it is. OK, so I'm a few months late! No one's perfect—not even me. Who's counting anyway? Speaking of counting, please, don't anybody write to me saying, "Chris, there were only seven items in your Top 10! Why! why! I—I—I don't understand; the incongruity of it all is stressing me out bigtime!" Look—if I could only find seven cool things this year, that's just the way life sometimes, and nothing any of us can do can change it. Consider this "Back Lot," among others things, an exercise in acceptance.

Speaking of incongruities: at first glance, the cool things I chose may appear to be a disjunct, hodge-podge of non sequiturs. I assure you, nothing could be further from the truth. There is, in fact, a common denominator—a thread that binds it all together. The frightening part is that twisted twine could possibly be my mind.



▲ Braveheart—Best movie ever made.

It's about saying what you mean, and doing what you say. Hamish and I order its viewing!

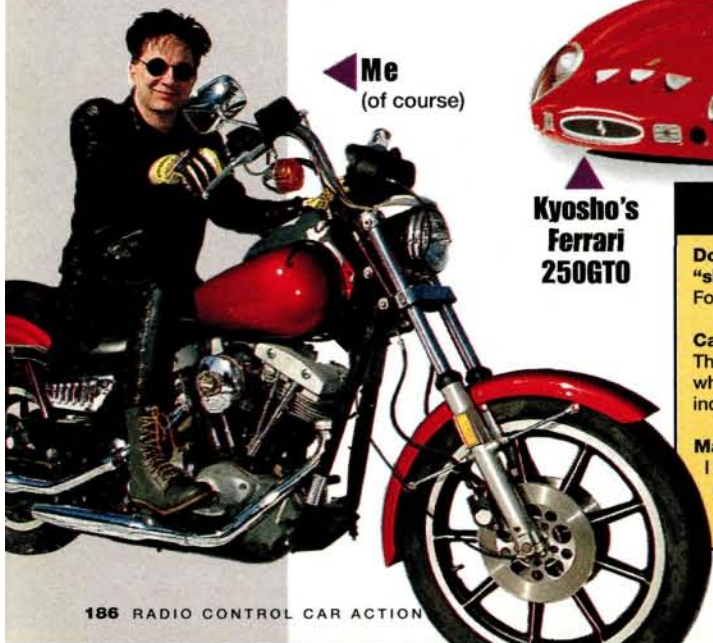
▲ Bravehound—Luna, of course.

This is how Luna looks at Frank Masi when he's even *thinking* of questioning my infinite wisdom.



▲ BMW Z3

▲ Me (of course)



▲ Kyosho's Ferrari 250GT



▲ Tamiya's Rover Mini Cooper



By air, land or sea, it's the
**Critters
Courageous Three**
Solar Cat, Dopefish and
Jet Pilot Piglet



Karate Women ▼

There's nothing like a girl who takes no crap.



The Color of Money

In the LameStream

Double-espresso mocha "skim" cafe latte
For yuppie-sheep frightened of real coffee.

Calvin Klein ads (second year winner)
These commercials are useful, however, when emergency-induced-vomiting is indicated.

Magazines with perfume stink.
I would like to note that, if you're the smelly type, by all means, feel free to carry five or six copies at all times.

Teen Mag
Superficial-supreme.

Following are just two examples of how badly things can go awry when we try to copy the Japanese:

Buick Riviera
Looks more like a Lady Remington electric shaver on wheels.

Ford Taurus Wagon
Oh, no! It's *Revenge of the AMC Pacer!*